

1 **Series:** Refuge Management  
 2 **Part 601:** National Wildlife Refuge System  
 3 **601 FW 3:** Biological Integrity, Diversity, and Environmental Health  
 4 **Will supersede 601 FW 3, 4/16/2001, as amended 07/31/2006**  
 5  
 6

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7  
 8 **OVERVIEW**  
 9

10 **3.1 What is the purpose of this chapter?** This chapter establishes the U.S. Fish and Wildlife  
 11 Service’s (Service) policy for maintaining and, where necessary and appropriate, restoring and  
 12 enhancing the Biological Integrity, Diversity, and Environmental Health (BIDEH) of the National Wildlife  
 13 Refuge System (Refuge System). This is an update to the 2001 BIDEH policy.  
 14

15 **3.2 What is the scope of this chapter?** This policy applies to all Refuge System units.  
 16

17 **3.3 What is the authority for this chapter?** The authority for this chapter is the National Wildlife  
 18 Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System  
 19 Improvement Act of 1997, [16 U.S.C. 668dd-668ee](#) (Refuge Administration Act, as amended). Section  
 20 668dd(a)(4)(B) of this law states, "In administering the System, the Secretary shall . . . ensure that the  
 21 biological integrity, diversity, and environmental health of the System are maintained for the benefit of  
 22 present and future generations of Americans." This is one of 14 directives to the Secretary of the  
 23 Interior that is in the Refuge Administration Act, as amended, which also calls on the Secretary, for  
 24 example, to ensure effective coordination with adjacent landowners and State fish and wildlife  
 25 agencies, and to provide opportunities for the public to experience compatible wildlife-dependent

26 recreation.

27

### 28 **3.4 What terms do you need to know to understand this chapter?**

29

30 **A. Adaptation.** Adjustment in natural or human systems to a new or changing environment that uses  
31 beneficial opportunities or moderates negative effects.

32

33 **B. Anthropogenic change.** Environmental change that humans cause or influence, either directly or  
34 indirectly.

35

36 **C. Biological integrity.** The capacity of an ecological system to support and maintain a full range of  
37 biotic composition, structure, function, and processes over time, that exhibit diversity, connectivity, and  
38 resilience at genetic, organism, population, and community levels. We evaluate biological integrity by  
39 referencing historical conditions, recognizing that climate change and other anthropogenic change are  
40 influencing refuge ecosystems.

41

42 **D. Climate change mitigation.** Measures taken to reduce the amount and speed of future climate  
43 change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere,  
44 including improving ecosystem capacity for biological carbon sequestration.

45

46 **E. Connectivity.** The degree to which landscapes, waterscapes, and seascapes allow species to move  
47 freely and ecological processes to function unimpeded.

48

49 **F. Conservation translocation.** Deliberately moving organisms from one site to another for release,  
50 with the intention of yielding a measurable conservation benefit at the levels of a population, species, or  
51 ecosystem.

52

53 **G. Diversity.** The variety of life and its processes, including the richness and abundance of living  
54 organisms, the genetic differences among them, and communities and ecosystems in which they occur.  
55 We evaluate diversity by referencing historical conditions, recognizing that climate change and other  
56 anthropogenic change are influencing refuge ecosystems.

57

58 **H. Ecological transformation.** The shift in an ecosystem, resulting in a new system that deviates from  
59 prior ecosystem structure and function or species composition.

60

61 **I. Ecosystem.** Systems comprised of biota (living organisms), the abiotic environment (e.g., air, light,  
62 soils, water), the interactions within and between them, and the physical space in which these  
63 operate.

64

65 **J. Environmental change.** An alteration or disturbance of the environment caused by humans or  
66 natural processes that generates differences in the function or characteristics of an ecosystem.

67

68 **K. Environmental health.** Composition, structure, and functioning of soil, water, air, and other abiotic  
69 features, including the abiotic processes that shape the environment. We evaluate environmental  
70 health by referencing historical conditions, recognizing that climate change and other anthropogenic  
71 change are influencing refuge ecosystems.

72

73 **L. Historical conditions.** The known or estimated composition, structure, and function of ecosystems  
74 that existed prior to ecological degradation caused by anthropogenic change, based on best available  
75 scientific and historical information.

76

77 **M. Indigenous Knowledge (IK).** A body of observations, oral and written knowledge, practices, and  
78 beliefs developed by Indigenous Peoples and applied to phenomena across biological, physical,  
79 cultural, and spiritual systems. IK can develop over millennia, continues to evolve, and includes insights  
80 based on evidence acquired through direct relationships with the environment, long-term experiences,  
81 extensive observation, and lessons and skills passed from generation to generation.  
82

83 **N. Indigenous Peoples.** Refers broadly to all Indigenous Peoples within all parts of the United States,  
84 not just those that have been federally recognized. This includes State-recognized Tribes; indigenous  
85 and Tribal community-based organizations; individual members of federally recognized Tribes,  
86 including those living outside Indian country; individual members of State-recognized Tribes; Alaska  
87 Natives; Native Hawaiians; Native Pacific Islanders; descendent communities; and individual Native  
88 Americans.  
89

90 **O. Invasive species.** With respect to a particular ecosystem, a non-native organism, including its  
91 seeds, eggs, spores, or other biological material, capable of propagating that species, whose  
92 introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or  
93 plant health.  
94

95 **P. Native.** With respect to a particular ecosystem, a species that, other than as a result of an  
96 introduction, historically occurred or currently occurs in that ecosystem, including when such a  
97 species expands or shifts its range as a result of natural processes in response to environmental  
98 change.  
99

100 **Q. Natural processes.** Interactions among plants, animals, and the environment that occur without  
101 substantial human influence.  
102

103 **R. Predator control.** Actions or programs with the intent or potential to alter predator-prey population  
104 dynamics on a refuge by reducing a population of native predators through lethal or nonlethal methods,  
105 except for actions necessary to protect public health and safety and those listed under [section](#)  
106 [3.13\(A\)\(2\)](#).  
107

108 **3.5 What is the BIDEH policy?** This policy:  
109

110 **A.** Guides implementation of the BIDEH mandate that Refuge Managers follow in fulfilling refuge  
111 purpose(s) and the mission of the Refuge System.  
112

113 **B.** Sets forth a framework by which we maintain and, where necessary and appropriate, restore and  
114 enhance BIDEH on refuges, both individually and as a network of intact, functioning, and resilient  
115 habitats for fish, wildlife, and plants, for the benefit of present and future generations of Americans.  
116

117 **C.** Helps provide for the conservation, management, and protection of the broad array of fish, wildlife,  
118 plants, and habitats found on refuges and associated ecosystems, while considering the effects of  
119 anthropogenic change on ecological processes, including climate change, habitat loss, invasive  
120 species, overexploitation, pollution, and other anthropogenic stressors.  
121

122 **3.6 What are the goals of this policy?** Our goals are to:  
123

124 **A.** Provide guidance on:  
125

126 **(1)** Ensuring the BIDEH of the Refuge System is maintained through the conservation and  
127 management of refuge ecosystems and all their components and processes across multiple spatial

- 128 scales;
- 129
- 130 **(2)** Promoting natural processes; and
- 131
- 132 **(3)** Addressing ecological transformation caused by climate change and other anthropogenic change to
- 133 accomplish the Refuge System mission.
- 134
- 135 **B.** Direct Refuge System employees to use the best available scientific information, relying on sound
- 136 professional judgment, and Indigenous Knowledge to ensure that refuge management contributes to
- 137 and does not diminish BIDEH for the benefit of fish and wildlife conservation.
- 138
- 139 **C.** Describe our principles and directives for conserving and managing refuge ecosystems to ensure
- 140 the BIDEH of the Refuge System.
- 141
- 142 **D.** Provide direction on select refuge management activities and uses that may support the BIDEH of
- 143 the Refuge System when appropriately applied and explain the standard for employing these
- 144 management tools. The specific activities and uses this policy addresses include predator control,
- 145 conservation translocations, genetically engineered organisms, invasive species management,
- 146 pesticide use, agricultural practices, and mosquito control.
- 147

## 148 RESPONSIBILITIES

149

150 **3.7 What are the Service’s responsibilities for the BIDEH policy and its implementation?** See

151 Table 3-1.

152

153

**Table 3-1: Responsibilities for BIDEH Policy and Its Implementation**

These employees...	Are responsible for...
<b>A. The Director</b>	Approving national policy, goals, and objectives for maintaining, restoring, and enhancing the BIDEH of the Refuge System.
<b>B. Chief – Refuge System (Headquarters)</b>	<p><b>(1)</b> Managing efforts to ensure the Refuge System achieves BIDEH, which includes development of this policy and overseeing its implementation.</p> <p><b>(2)</b> Ensuring that national plans and partnerships support conservation and management of the BIDEH of the Refuge System.</p> <p><b>(3)</b> Ensuring that the national land acquisition strategy for the Refuge System is designed to enhance the BIDEH of the Refuge System at all spatial scales, in alignment with our Strategic Growth policy (<a href="#">602 FW 5</a>) and in consideration of climate change impacts.</p> <p><b>(4)</b> Providing support and guidance to Refuge Managers and Regional Refuge Chiefs regarding peer review and risk assessment processes, when applicable.</p>
<b>C. Regional Directors</b>	<p><b>(1)</b> Implementing this policy by approving Regional goals and objectives for maintaining, restoring, and enhancing the BIDEH of the Refuge System, including resolving conflicts to promote and uphold BIDEH in response to anthropogenic stressors.</p> <p><b>(2)</b> Ensuring that landscape plans and Regional partnerships support</p>

These employees...	Are responsible for...
	maintenance and restoration of the BIDEH of the Refuge System.
<b>D. Regional Refuge Chiefs</b>	<p>(1) Implementing this policy by providing Regional goals and objectives for maintaining, restoring, and enhancing the BIDEH of the Refuge System.</p> <p>(2) Ensuring that refuge Comprehensive Conservation Plans support maintaining, restoring, and enhancing the BIDEH of the Refuge System.</p> <p>(3) Reviewing and ensuring management programs that occur on refuges are consistent with this policy.</p>
<b>E. Refuge Managers</b>	<p>(1) Incorporating the principles and directives of this policy into all refuge management plans and actions.</p> <p>(2) Coordinating with Regional leadership and Refuge System Headquarters to lead peer review and risk assessment processes, when applicable.</p>

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## KEY CONCEPTS AND PROCESSES FOR ENSURING BIDEH

**3.8 How does the Service implement this policy?** In addition to the responsibilities we describe in section 3.7E, Refuge Managers must carry out the following tasks, which they may conduct through refuge planning processes (see 602 FW 1-6), National Environmental Policy Act (NEPA) analyses, and compatibility determinations:

- A.** Identify the refuge's purpose(s), legislative responsibilities, and ecological role within the landscape. Consider the relationships between these factors, BIDEH, and the Refuge System mission to identify and resolve potential conflicts among them.
- B.** Assess the current status of BIDEH on the refuge through appropriate environmental studies, including, but not limited to, baseline vegetation studies or population surveys and studies.
- C.** Consider potential impacts to BIDEH from anthropogenic change by referencing historical conditions and comparing them to current conditions and plausible future ecological conditions, especially with respect to climate change.
- D.** Consider how environmental change is affecting or will affect refuge fish, wildlife, plants, and habitats and identify the refuge's future potential to conserve vulnerable species and sustain diverse, functioning, resilient ecosystems that support adaptation to climate change.
- E.** Consider the refuge's contribution to local, regional, and landscape scales of BIDEH, including in the context of anthropogenic change and ecological transformation, as appropriate.
- F.** When identifying desired future conditions for the refuge and appropriate management actions to achieve those conditions in accordance with 602 FW 1-6 and this policy, determine the appropriate management direction to maintain, restore, or enhance BIDEH on the refuge, while still achieving refuge purpose(s).

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**G.** Conduct all refuge management activities and uses in accordance with the principles, management directives, and relevant guidance in this policy and with our BIDEH regulations at 50 CFR 29.3 (BIDEH regulations- *under development*).

**H.** Incorporate adaptive management principles ([522 DM 1](#)) into decision making through an iterative cycle in which we evaluate, learn, and apply new information to our conservation practices using a scientific, systematic approach that is based on measurable objectives and targeted monitoring in alignment with Service policy on inventory and monitoring (see [701 FW 2](#)).

**3.9 What are the principles underlying this policy?**

**A. Wildlife First.** The Refuge Administration Act, as amended, clearly establishes that wildlife conservation is the singular Refuge System mission. [House Report 105-106](#), which accompanies the National Wildlife Refuge System Improvement Act of 1997 states, "... the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." BIDEH are critical components of wildlife conservation.

**B. Fulfill refuge purposes and ensure BIDEH.** The Refuge Administration Act, as amended, states that the Service must manage each refuge to fulfill both the Refuge System mission and the specific purpose(s) for which that refuge was established. It requires that we maintain the BIDEH of the Refuge System. Refuge Managers accomplish these integral mandates together by conserving and managing, and, where necessary and appropriate, restoring and enhancing BIDEH on each refuge.

**C. Consider BIDEH at multiple spatial scales.** We may measure BIDEH at various spatial scales, from refuge to local, regional, and landscape scales. We seek to maintain, restore, or enhance BIDEH at the refuge scale, and support conservation at larger spatial scales where it is feasible and supports fulfillment of refuge purpose(s) and the Refuge System mission.

**D. Promote natural processes.** Refuge management must allow for and defer to natural processes unless they cannot achieve refuge conservation goals and objectives. In those cases, we may intervene to supplement natural processes with science-based management techniques that maintain, restore, or mimic natural ecosystem processes or functions, or facilitate adaptation to anthropogenic change. Such management actions may range from preservation to active manipulation of habitats and populations to ensure BIDEH.

**E. Consider climate and other anthropogenic change.** We acknowledge that climate change is rapidly and fundamentally affecting all ecosystems at a global scale. Refuge Managers must make complex decisions to fulfill refuge purposes and the Refuge System mission, as well as to ensure BIDEH, under uncertain climate-driven ecological conditions, in accordance with Service policy on Climate Change Action ([056 FW 1](#)). To be flexible and responsive to change, we should continually consider new stewardship approaches and adapt existing management actions based on sound monitoring data, best available science, and Indigenous Knowledge that are guided by conservation values.

**F. Use sound professional judgment.** Refuge Managers must use sound professional judgment to ensure that management actions benefit wildlife conservation by maintaining and, where necessary and appropriate, restoring and enhancing BIDEH. Sound professional judgment, as defined in the Refuge Administration Act, as amended, and existing Refuge System regulations, means managers must make their finding, determination, or decision to conduct a refuge management activity consistent with principles of sound fish and wildlife management and available science and resources, as well as their

236 field experience and knowledge of the particular refuge’s resources.

237

238 **G. Use best available science.** Refuge Managers must use the best available scientific information to  
239 inform their sound professional judgment, in accordance with the Department of the Interior’s Scientific  
240 Integrity Policy ([305 DM 3](#)), Service policy on Scientific Integrity and Scholarly Conduct ([212 FW 7](#)) and  
241 Data Management ([274 FW 1](#)), and the Service’s Information Quality Guidelines. Evidence-based  
242 decisions guided by the best available science and data, as well as Indigenous Knowledge and peer  
243 review as prescribed in this policy, help ensure management actions benefit wildlife conservation.

244

245 **H. Allow compatible wildlife-dependent recreation.** The priority wildlife-dependent public uses,  
246 established by the National Wildlife Refuge System Improvement Act of 1997, are not in conflict with  
247 this policy when the Refuge Manager determines they are compatible with the purposes of the refuge  
248 and the mission of the Refuge System. However, conserving and managing BIDEH may require spatial  
249 or temporal zoning of public use programs and associated infrastructures. Success in maintaining,  
250 restoring, or enhancing BIDEH generally provides higher quality opportunities for wildlife-dependent  
251 public use.

252

253 **I. Coordinate with Adjacent Landowners, State and Tribal partners.** We recognize that refuge  
254 management can affect adjacent landowners and other partners, including States and Tribes. To  
255 provide the greatest conservation benefits across the landscape, we encourage cooperation and  
256 coordination with State fish and wildlife agencies in our efforts to ensure BIDEH, as appropriate and  
257 consistent with 43 CFR 24.4(e) and the Service’s policy on Coordination and Cooperative Work with  
258 State Fish and Wildlife Agencies ([601 FW 7](#)). We also encourage effective coordination, interaction,  
259 and cooperation with owners of land adjoining refuges. We also cooperate and coordinate with federally  
260 recognized Tribes and other Indigenous Peoples, consistent with the Service’s Native American Policy  
261 ([510 FW 1](#)), to protect treaty, religious, subsistence, and cultural interests in Refuge System lands,  
262 waters, and wildlife.

263

264 **3.10 What management directives does the Service follow to ensure BIDEH?** The following  
265 directives create a framework within which Refuge Managers can determine and implement  
266 management activities and uses. They accord with our BIDEH regulations at 50 CFR 29.3(c) (*under*  
267 *development*) and guide management decisions consistent with other applicable laws, regulations, and  
268 policy. When making management decisions in line with these directives, we assess and minimize the  
269 risk of unintended consequences, basing our actions on the best available science and sound  
270 professional judgment.

271

272 **A. Address climate change.**

273

274 **(1)** Climate change and other anthropogenic stressors are transforming historical species composition  
275 and the ecological function of refuge habitats. Climate change is a major driver in species decline and  
276 biodiversity loss, and ecosystem conservation can serve an essential role in climate change mitigation  
277 and adaptation, as well as species survival and recovery.

278

279 **(a)** Supporting biological diversity helps ensure a variety of life to adapt across a broad range of  
280 uncertain future conditions. Because of this, we manage species and habitats by deploying  
281 climate change mitigation and adaptation strategies when necessary to meet statutory  
282 requirements, fulfill refuge purposes, and ensure BIDEH.

283

284 **(b)** Supporting biological integrity through functioning, adaptive environments also provides vital  
285 ecosystem services such as fire resistance, pollination, flood control, and protective buffers for  
286 both wildlife habitats and human communities against extreme weather events. For example,

287 protecting and restoring biodiverse habitats can help mitigate climate change by increasing their  
288 carbon sequestration and storage capacity, as well as by supporting ecological adaptation to  
289 climate change effects.

290  
291 **(2)** We may use a combination of management responses to address climate change impacts. For  
292 example, in some locations we may work to resist climate change by maintaining or restoring  
293 ecosystems based on historical conditions. In other locations we may accept climate-driven ecological  
294 transformation by allowing ecosystems to change without intervention, or we may direct ecological  
295 transformation by actively shaping ecosystems toward conditions supporting new diverse assemblages  
296 of species and habitat types. This combination of approaches helps minimize biodiversity loss and  
297 promotes potential future gains in biodiversity as ecosystems adapt and change.

298  
299 **B. Conserve and connect habitat.**

300  
301 **(1)** We prioritize deference to natural processes and promote conservation, restoration, and ecological  
302 connectivity as a means of achieving refuge habitat objectives and landscape planning goals. However,  
303 when natural processes cannot meet refuge objectives or facilitate adaptation to anthropogenic change,  
304 we may intervene with science-based management techniques or acquire lands to meet statutory  
305 requirements, fulfill refuge purposes, and ensure BIDEH. For example, we may use prescribed fire,  
306 silvicultural practices, reforestation, conservation translocation, provision of habitat structures, moist soil  
307 management, or other techniques that mimic natural processes to conserve habitat function, restore  
308 ecosystem services, and support climate change adaptation. We may implement these techniques  
309 through the step-down planning process (see [602 FW 4](#)).

310  
311 **(2)** We take a proactive approach to identifying, acquiring, and conserving lands and waters that are  
312 critical for maintaining, restoring, and enhancing the BIDEH of the Refuge System at all spatial scales,  
313 consistent with our Refuge System planning policies (602 FW 1 – 6). We avoid and minimize habitat  
314 fragmentation.

315  
316 **(a)** Protected, connected, and intact habitats are essential to sustain biological integrity and  
317 diversity as many species require habitat corridors, linkages, or contiguous blocks to allow  
318 seasonal migrations, gene flow, and movement in response to changing conditions.

319  
320 **(b)** We conserve such refuge habitats to support species persistence and resilience, facilitate  
321 adaptation to climate-induced range shifts, and enable species to adapt, disperse, or adjust to  
322 other anthropogenic stressors such as habitat loss, invasive species, overexploitation, and  
323 pollution.

324  
325 **(c)** We may seek to acquire additional lands to establish wildlife corridors that improve  
326 connectivity and allow species movement from one habitat to another in support of BIDEH.

327  
328 **(3)** We seek to maintain BIDEH at the refuge scale and restore or enhance lost or degraded elements  
329 at all spatial scales where it supports refuge purposes or adaptation to anthropogenic change. Our  
330 Habitat and Species Step-down Planning policy (602 FW 6 - *under development*) advises us to assess  
331 and, when necessary, improve ecosystem conditions for priority habitats and priority species while  
332 considering historical, current, and plausible future ecological conditions on our refuges across multiple  
333 spatial scales.

334  
335 **(4)** We avoid resource intensive activities and uses such as logging or livestock grazing unless they:

336  
337 **(a)** Are prescribed in approved management plans;



- 338  
339 (b) Comply with compatibility requirements and are consistent with refuge purposes;  
340  
341 (c) Align with our BIDEH regulations and all principles and directives of this policy; and  
342  
343 (d) Only when more natural methods, such as fire or grazing by native herbivores, cannot  
344 achieve refuge goals and objectives.

345  
346 (5) See [section 3.13](#) for further guidance on certain habitat management activities and uses, including  
347 use of agricultural practices and pesticides.

### 348 349 **C. Conserve and manage fish and wildlife populations.**

350  
351 (1) We conserve and manage fish and wildlife populations to meet refuge population objectives, sustain  
352 ecosystems, and, where appropriate, restore or recover imperiled species. We prioritize deference to  
353 natural processes as the default for determining sustainable populations. However, when habitat  
354 conditions or natural processes are insufficient to meet refuge population goals and objectives or  
355 facilitate adaptation to anthropogenic change, we may supplement them with science-based  
356 management techniques to meet statutory requirements, fulfill refuge purposes, and ensure BIDEH. For  
357 example, supplemental management actions could include captive breeding, reintroduction, stocking,  
358 or supplementary feeding to support viable populations of threatened or endangered species on  
359 refuges.

360  
361 (2) We maintain, or contribute to the maintenance of, populations of native species. We formulate our  
362 management strategies by considering population densities, social structures, and population dynamics  
363 at the refuge scale and how anthropogenic change and ecological transformation have altered or may  
364 alter the natural processes driving population parameters. We also consider population objectives set  
365 by national plans and programs in which we are partners, such as the North American Waterfowl  
366 Management Plan.

367 (a) In general, we adaptively manage native populations to mimic the densities and levels of  
368 variation created by natural processes, while maintaining viable populations of imperiled or rare  
369 species.

370  
371 (b) Due to surrounding habitat loss or other anthropogenic change, on some refuges we may  
372 establish goals and objectives for higher population densities than might naturally occur to  
373 achieve a closer approximation of natural densities at larger spatial scales.

374  
375 (c) Our management goals and practices target population densities that would not result in  
376 adverse effects on wildlife and habitat such as disease, excessive nutrient accumulation, or the  
377 competitive exclusion of other native species.

378  
379 (3) We do not require any action to reduce or eradicate self-sustaining populations of non-native,  
380 noninvasive species (e.g., pheasants) unless those species interfere with fulfilling refuge purposes or  
381 ensuring BIDEH. We manage invasive species, genetically engineered organisms, and species  
382 introductions in accordance with [section 3.13](#) of this policy, which also addresses predator control and  
383 mosquito control.

### 384 385 386 **D. Uphold water rights.**

387  
388 (1) Water is a foundational element for ecological health and thus critical to sustaining ecosystems, yet

389 climate change and other anthropogenic drivers are exacerbating water scarcity across the United  
390 States. Reduced water supplies hamper our ability to meet refuge purposes and the Refuge System  
391 mission, particularly in conserving wetland and riparian areas. As precipitation patterns change and  
392 drought impacts larger geographic areas, the Service should improve efficiencies in hydrological  
393 infrastructure and water use and must pursue and secure the water rights necessary to support the  
394 migratory birds, fish, and other wildlife that rely on refuge habitats. The Refuge Administration Act, as  
395 amended, requires us to "... assist in the maintenance of adequate water quantity and quality to fulfill  
396 the mission of the System and the purposes of each refuge" and establishes a clear duty to "... acquire  
397 under State law, water rights that are needed for refuge purposes" (see 16 U.S.C. 668dd(a)(4)(F) - (G)).  
398

399 **(2)** We must maintain and exercise our water rights, including, but not limited to, contracts,  
400 entitlements, and other acquisitions, allocations, or conveyance mechanisms, on refuge habitats in  
401 accordance with local, State, and Federal laws, and acquire, transfer, or lease water rights where  
402 necessary to meet statutory requirements, fulfill refuge purposes, and ensure BIDEH. This includes, for  
403 example, improving agency operations with respect to identification and protection of relevant water  
404 rights, working with willing partners to transfer additional water rights to refuges, acquiring water assets  
405 through contracts, purchasing water rights with appropriated funds, acquiring new refuge lands with  
406 appurtenant senior water rights, and participating in State water rights adjudications and Federal  
407 agency negotiations to perfect and defend refuge water rights. See the Service's Water Rights policy at  
408 [403 FW 1](#) for more information.  
409

410 **E. Promote and maintain healthy soil, water, and air.** We must promote and maintain abiotic  
411 features vital for sustaining and restoring refuge habitats, such as soil health, water quality and  
412 quantity, and air quality. Among all abiotic resources present on refuges, these features are partially  
413 within our management control and are especially important to ensuring environmental health. To the  
414 extent we have jurisdiction over soil, water, and air, we must conserve and manage these essential  
415 resources to meet statutory requirements, fulfill refuge purposes, and ensure BIDEH. We must address  
416 threats to these abiotic components, including when such threats to refuge resources arise outside  
417 refuge boundaries, by pursuing appropriate action in accordance with [section 3.15](#) of this policy.  
418

419 **(1) Soil:** Refuge management actions must strive to maintain healthy soils as a foundation for living  
420 ecosystems. Soil degradation—compaction, depleted nutrients, contamination, erosion, and increased  
421 sedimentation in waterways—can cause population declines in fish and other species, while healthy  
422 soils cycle nutrients, filter potential pollutants, provide physical stability, regulate water flows, and  
423 sustain plant and animal life. Healthy soils also increase ecosystem capacity for biological carbon  
424 sequestration, thereby mitigating the effects of climate change. Techniques to promote soil health may  
425 include rebuilding organic soil material, restoring soil biodiversity, maximizing the presence of living  
426 roots, and reducing mechanical manipulation and synthetic inputs.  
427

428 **(2) Water:** In addition to addressing water deficiencies as described in section 3.10(D), we also address  
429 water quantity and quality impairments on refuges resulting from previous and current land  
430 uses, stormwater or agricultural runoff, pollutants from off-refuge discharges, floods, and upstream  
431 sources. Techniques to improve water quantity and quality may include restoring wetland and riparian  
432 areas as well as watershed forests, engaging with State and local water quality agencies, reducing the  
433 use of pesticides, and following best management practices when conducting agriculture or forestry  
434 activities on refuges. For information on compliance with the Clean Water Act, see the Service's Clean  
435 Water Act policy at [561 FW 3](#).  
436

437 **(3) Air:** We must employ best management practices to promote air quality. We recognize that  
438 operation of vehicles, equipment, and the use of certain important management tools, such as  
439 prescribed fire, may have a negative, but temporary, impact on air quality. To lessen these negative

440 impacts and minimize air quality degradation, we must apply effective and practicable management  
441 practices or undertake measures consistent with Service policy and regulation. For example, we may  
442 transition to fuel efficient vehicles and heavy equipment with higher emission standards, adhere to the  
443 Service's Fire Management program and air quality protection policies ([621 FW 1](#) and [563 FW 1](#),  
444 respectively), and coordinate with State and local air quality management agencies to reduce impacts  
445 on air quality.

446  
447 **3.11 What factors does the Service consider when maintaining, restoring, and enhancing**  
448 **BIDEH?** We consider the elements of BIDEH in an integrated and holistic manner. The highest  
449 measure of BIDEH on refuges is represented by diverse, functioning, and self-sustaining habitats and  
450 wildlife populations that are resilient to emerging or future conditions.

451  
452 **A. Biological integrity.**

453  
454 **(1)** We evaluate biological integrity by referencing the extent to which biological composition, structure,  
455 and function have been altered throughout time and examining the extent to which they may be altered  
456 by climate change and other stressors in the future.

457  
458 **(a)** Biological composition refers to biological components such as genes, populations, species,  
459 and communities.

460  
461 **(b)** Biological structure refers to the organization of biological components, such as gene  
462 frequencies, social structures of populations, food webs, and niche partitioning within  
463 communities.

464  
465 **(c)** Biological function refers to the processes that biological components undergo, such as  
466 genetic recombination, population migration, the evolution of species, and community  
467 succession.

468  
469 **(2)** Biological integrity lies along a continuum from a biological system extensively degraded by climate  
470 change and other anthropogenic stressors to a more natural system that has experienced less  
471 anthropogenic change. We strive to prevent further loss of the natural biological features and processes  
472 that comprise biological integrity and to restore or enhance ecosystem function or facilitate ecological  
473 transformation, where appropriate. When climate change generates novel ecosystems and biological  
474 assemblages, we may conserve comparable ecological function rather than historical species  
475 composition. We consider current changes to the frequency and timing of natural processes such as  
476 flooding and fires, and use appropriate tools to identify and assess potential future shifts. We may find it  
477 necessary to implement management actions that modify the frequency and timing of natural processes  
478 at the refuge scale to fulfill refuge purpose(s), contribute to biological integrity at larger spatial scales,  
479 support adaptation, or promote desired future conditions.

480  
481 **(3)** Because maintaining or restoring biological integrity is not the same as maximizing biological  
482 diversity, we consider how managing for biological integrity can support biological diversity.  
483 Maintaining biological integrity may entail managing for a single species or community at some refuges  
484 and combinations of species or communities at other refuges. For example, maintaining habitat for an  
485 endangered species on a refuge may reduce biological diversity at the refuge scale, while it contributes  
486 to biological integrity and diversity at the ecosystem or Refuge System scale.

487  
488 **B. Biological diversity.**

489  
490 **(1)** We evaluate biological diversity at various taxonomic levels, including class, order, family, genus,

491 species, subspecies, and—for purposes of Endangered Species Act (ESA; 16 U.S.C. 1531 et seq.)  
492 implementation—distinct population segment. These evaluations of biological diversity begin with a  
493 baseline inventory of flora and fauna at the refuge level. We also consider biological diversity occurring  
494 on refuges in the context of other spatial scales.

495

496 **(2)** We reference historical species composition and consider the extent to which climate change and  
497 other anthropogenic change have altered or may alter biological diversity in the future as refuge  
498 ecosystems transform and species and habitats shift in range. We strive to maintain populations of  
499 breeding individuals that are genetically viable and functional. We provide for the breeding, migrating,  
500 and wintering needs of migratory species. We attempt to maximize the size of contiguous habitat,  
501 restore and maintain connectivity between blocks of habitats, and protect wildlife corridors to foster  
502 ecosystem resilience and help ensure species can move naturally throughout habitats as needed.

503

### 504 **C. Environmental health.**

505

506 **(1)** We evaluate environmental health by referencing the extent to which environmental composition,  
507 structure, and function have been altered throughout time, and examining the extent to which climate  
508 change and other stressors may alter them in the future.

509

510 **(a)** Environmental composition refers to abiotic components such as soil, water, and air.

511

512 **(b)** Environmental structure refers to the organization of abiotic components, such as  
513 topography, aquifer structure, and atmospheric layering.

514

515 **(c)** Environmental function refers to the processes that involve abiotic components, such as  
516 erosion, tidal regimes, evaporation, and wind.

517

518 **(2)** We especially consider environmental features as they affect living organisms, avoiding degradation  
519 of environmental health on refuges to the maximum extent possible to support species conservation.

520

521 **(a)** For example, at the genetic level, we manage for environmental health by preventing or  
522 remediating contamination of soil, water, and air that may interfere with reproductive physiology  
523 or stimulate high rates of mutation.

524

525 **(b)** At the population and community levels, we manage for environmental health by protecting  
526 the habitat components of food, water, cover, and space. For example, we seek to prevent food  
527 and water from becoming polluted, resource use and extraction from impacting species'  
528 biological needs, anthropogenic noise and light pollution from compromising migration and  
529 reproduction patterns, and unnatural physical structures and other infrastructure from displacing  
530 species or creating obstacles to wildlife movement.

531

### 532 **3.12 How does the Service reference historical conditions and incorporate information on** 533 **environmental change into management decisions, and where do employees obtain this** 534 **information?**

535

536 **A.** An ecological frame of reference within which to compare the changing conditions of refuge  
537 ecosystems is essential to ensuring that the BIDEH of the Refuge System is maintained and, where  
538 necessary and appropriate, restored and enhanced. Because climate change and other anthropogenic  
539 stressors such as habitat loss, invasive species, water scarcity, overexploitation, and pollution are  
540 transforming ecosystems, we develop this frame of reference by considering both historical conditions  
541 and plausible future ecological conditions for a refuge's species and habitats. This frame of reference

542 allows us to examine how refuge ecosystems functioned prior to anthropogenic ecological degradation,  
543 assess current conditions, and identify desired future conditions to guide refuge goals and objectives.  
544

545 **B.** We consider historical conditions as a reference point, rather than an end goal, for refuge  
546 management. This untethers current and future management actions from sustaining historical  
547 conditions that may no longer be possible or desirable on many refuges, while acknowledging the value  
548 of a contextual historical baseline for developing management goals and objectives.  
549

550 **(1)** We reference historical conditions on and around refuges to identify the composition, structure, and  
551 functional processes that shaped ecosystems before changes in land use altered and fragmented  
552 habitat, diminished wildlife populations, and drove species to extirpation or extinction.  
553

554 **(2)** We particularly seek to identify keystone species, indicator species, and the types of communities  
555 that may have previously occurred on the refuge, ascertain basic information on ecosystem structure  
556 and function, e.g., distribution of plant communities, and understand the scale and frequency of natural  
557 processes such as fire regimes, flooding events, and plant community succession.  
558

559 **(3)** We may reference the historical conditions of similar ecosystems beyond refuge boundaries to  
560 provide guidance for assessing novel or emerging ecosystems on refuges.  
561

562 **C.** We consider how environmental change is currently affecting BIDEH at multiple spatial scales,  
563 especially at the refuge level. We assess how anthropogenic change and climate-driven ecological  
564 transformation are rearranging historical species composition, causing habitats to shift outside their  
565 historical range, and altering refuge ecosystems by contrasting current conditions with historical  
566 conditions. We identify plausible future ecological conditions and desired future conditions through  
567 scenario planning, and we use this information as the basis for determining whether to resist, accept, or  
568 direct changes in habitat or ecosystem processes, function, structure, or composition. We incorporate  
569 this analysis into our management goals and objectives determined in our planning processes and  
570 implement appropriate climate change adaptation and mitigation strategies in accordance with the  
571 directives in [section 3.10](#) to ensure that BIDEH is maintained on the refuge and across the larger  
572 Refuge System.  
573

574 **D.** We obtain information on historical conditions, climate change and other anthropogenic change, and  
575 desired future conditions from a range of sources, including published, peer-reviewed research;  
576 literature reviews; data and information produced by Federal, State, local, and Tribal governments;  
577 Indigenous Peoples; scientific and non-governmental organizations; our own primary scientific  
578 investigations; and similar sources.  
579

580 **(1)** Information on historical conditions may be historical, archeological, or from related fields of inquiry,  
581 and may include Indigenous Knowledge held by, written by, and in some cases, contained in oral or  
582 pictographic accounts of Indigenous Peoples. Records of explorers, surveyors, traders, and early  
583 settlers are also important historical references, as well as studies of soil sediments, tree rings, and  
584 similar indicators of historical conditions.  
585

586 **(2)** Archeological information may be derived from collections of cultural artifacts maintained by  
587 scientific institutions, as well as our own archaeological explorations on refuges.  
588

589 **(3)** In addition to primary and applied research, scientifically modeled projections at appropriate scales  
590 are critical for understanding the effects of climate change and other anthropogenic change, as well as  
591 strategies for achieving desired future conditions on refuges.  
592

593 (4) Finally, during our planning processes, we must regularly update our information on historical  
594 conditions, current conditions, environmental change, and desired future conditions as scientific  
595 information improves.  
596

## 597 **MANAGEMENT DECISIONS**

598  
599 **3.13 How does the Service conduct select management activities and uses identified in the**  
600 **BIDEH regulations?** Our regulations at 50 CFR 29.3(d) (*under development*) and this policy provide  
601 additional guidance for certain management activities and uses that have a particular propensity to  
602 impact BIDEH. Refuge Managers may only conduct these activities and allow these uses, explained  
603 below, in conformance with the standards and directives at 50 CFR 29.3(a) and (c), which are also  
604 integrated into this policy. While the regulations direct a default position regarding use of each  
605 management practice, they also provide flexibility to implement them as conservation tools when the  
606 Refuge Manager determines they are necessary to meet statutory requirements, fulfill refuge purposes,  
607 and ensure BIDEH based on a comprehensive analysis under NEPA, other legal mandates, and peer  
608 review, as applicable.  
609

610 **A. Native predator control.** We generally prohibit control of native predators because a growing  
611 scientific record indicates that predators are essential to maintaining biodiversity and ecosystem  
612 function. We prioritize maintaining the evolutionary and ecological role of predators and predation on  
613 refuges to comply with the Refuge Administration Act, as amended, and authorize predator control only  
614 in response to a specific and significant conservation concern as determined by the Service.  
615 Accordingly, we only permit predator control in limited circumstances when such action is necessary to  
616 meet statutory requirements, fulfill refuge purposes, and ensure BIDEH. For example, predator control  
617 may be deemed necessary to protect a threatened or endangered species, or to prevent extirpation of a  
618 local prey population when such loss would be detrimental to the overall conservation of that species.  
619

620 (1) In all cases, we first must evaluate the use of nonlethal techniques for predator control, such as live  
621 trapping or hazing, before conducting any lethal removal. We allow use of lethal predator control only  
622 after we have evaluated other feasible alternative methods, and we consider it the only practical means  
623 of addressing the conservation concern and ensuring BIDEH. Most predator control activities will  
624 require scientific peer review prior to approval. We determine whether to conduct peer review based on  
625 the peer review requirements in [section 3.14C](#).  
626

627 (2) We do not include the following actions in our definition of predator control:

628  
629 (a) Agency removal of native predator(s) solely to protect public health and safety, for example,  
630 removal of an individual animal responsible for attacks on humans or to control a wildlife  
631 disease outbreak;

632  
633 (b) Use of barriers or nonlethal deterrents to protect the public, property, or vulnerable species,  
634 but that are not intended to reduce native predator populations;

635  
636 (c) Compatible, refuge-approved taking of fish and wildlife for subsistence uses under Federal  
637 or State subsistence regulations that do not compromise maintaining BIDEH on the refuge;

638  
639 (d) Compatible, refuge-approved recreational hunting and fishing opportunities that do not  
640 compromise maintaining BIDEH on the refuge; and

641  
642 (e) Removal of invasive species.

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**B. Conservation translocations.** Climate change is causing, or is anticipated to cause, suitable habitat for many species to shift beyond their historical range, while other threats may also reduce the viability of habitat to support one or more life history stages within a species' current or historical range. When species are unable to adapt to changing environmental conditions or move to more suitable habitats, it may result in extinction, extirpation, or loss of ecosystem function. Consequently, it may be necessary and appropriate for refuges to authorize species' translocation to other areas within or outside their current range, including areas beyond their historical range, to facilitate better adaptation to the impacts of climate change and other threats.

**(1)** We may allow the introduction or reintroduction of a species to Refuge System habitats outside its current range to avoid extinction or extirpation, restore a species to its former range, reestablish a specific ecological function lost to extinction or extirpation of another species, or in accordance with regulations under the ESA regarding management of experimental populations (see 50 CFR 17.81(a)). We may allow such conservation translocations only when necessary to meet statutory requirements, fulfill refuge purposes, and ensure BIDEH as informed by the best available scientific information.

**(2)** All conservation translocations that propose to move a species outside of its current range require a comprehensive risk assessment to inform management decisions and analyze potential threats to both the source population and destination ecosystem.

**(a)** Such translocations will likely also require scientific peer review prior to approval, which may be integrated with the risk assessment. We determine whether to conduct peer review based on the peer review requirements in [section 3.14C](#).

**(b)** Such translocations also require an implementation plan that includes procedures for handling, transporting, and releasing the translocated species; long-term management strategies; and monitoring protocols to determine whether a population is becoming established and to ensure there are no unexpected adverse impacts on the destination ecosystem and associated human, animal, or plant communities. If unintended adverse consequences are observed, we must adapt our management strategies to remediate the concerns and ensure BIDEH of refuge ecosystems.

**(c)** See the Service's policy on Conservation Introductions (*under development* at 701 FW 3) for additional information and requirements for moving a species outside its historical (indigenous) range.

**(3)** In general, proposals for conservation translocations that move a species within its current range should also follow the procedures in section 3.13B(2) above, particularly those proposals deemed significant Federal actions under NEPA. We must conduct all conservation translocations consistent with other applicable Service policies on capturing, handling, and transporting species, and comply with all applicable State laws and regulations.

**C. Use of Genetically Engineered Organisms (GEO).** We take a cautionary approach to our wildlife management practices by generally prohibiting the use of plants, animals, or other organisms that have been genetically modified through genetic engineering, subject to the exceptions described in this section. We take this approach because GEOs can have unpredictable and unintended effects on species and ecosystems, necessitating careful assessment of their use on refuges on a case-by-case basis. Refuge Managers must obtain authorization for use of GEOs consistent with applicable Service policies.

694 (1) We recognize that scientific advances in genetic engineering may provide vital management tools to  
695 improve species conservation and ecosystem health, particularly in response to climate change or  
696 other anthropogenic change, invasive species, and other stressors. For example, genetic engineering  
697 may advance our ability to protect and restore imperiled species in the face of climate change by  
698 introducing adaptive traits such as heat or drought tolerance and disease or pest resistance in plants or  
699 animals. For this reason, we may allow exceptions for use of GEOs when it is necessary to meet  
700 statutory requirements, fulfill refuge purposes, and ensure BIDEH.

701  
702 (a) We require a comprehensive risk assessment to inform management decisions by assessing  
703 the proposed use of GEOs and analyzing the potential threats to the recipient ecosystem and  
704 associated human, animal, and plant communities.

705  
706 (b) The proposed use of GEOs will also likely require scientific peer review prior to approval,  
707 which may be integrated with the risk assessment. We determine whether to conduct peer  
708 review based on the peer review requirements in [section 3.14C](#).

709  
710 (2) We typically do not use Genetically Engineered (modified) Crops (GEC) on the Refuge System  
711 because we have demonstrated that their use has not been essential to meet wildlife management  
712 objectives, i.e., GECs are generally unnecessary to meet statutory requirements, fulfill refuge purposes,  
713 and ensure BIDEH. We apply the same requirements as described for other GEOs to consider the rare  
714 situations in which GECs may be needed, for example, to facilitate habitat restoration or climate  
715 adaptation efforts. Refuge Managers must seek Regional Chief approval for use of GECs that they  
716 deem necessary to meet statutory requirements, fulfill refuge purposes, and ensure BIDEH. Regional  
717 Chief approval for each proposed use of GECs may be granted only on a case-by-case basis in  
718 accordance with this policy.

719  
720 **D. Invasive species management.** Invasive species pose a variety of threats to native species,  
721 ecosystems, and human health and safety. Facing little if any natural controls, invasive species can  
722 spread quickly into refuge habitats, causing extensive and costly damage to refuge ecosystems,  
723 reducing biodiversity, altering natural processes, and compromising our conservation mission.  
724 Therefore, we actively pursue actions to control invasive species when necessary to meet statutory  
725 requirements, fulfill refuge purposes, and ensure BIDEH.

726  
727 (1) Actions to control invasive species include preventing their introduction; engaging in detection,  
728 eradication, and control of invasive populations; and restoring native species and habitats in invaded  
729 ecosystems.

730  
731 (2) Refuge Managers must produce an integrated pest management plan to make decisions regarding  
732 invasive species control and to ensure a science-based process that minimizes risk to environmental  
733 health. An integrated pest management plan entails using current information about an invasive  
734 species' biology and life cycle, in combination with the most appropriate suite of mechanical, chemical,  
735 biological, and cultural tools to effectively prevent, eradicate, and control invasive species while  
736 protecting native fish, wildlife, plants, and human health. See [569 FW 1](#), Integrated Pest Management,  
737 for more information.

738  
739 **E. Pesticide use.** Refuge Managers use pesticides—including herbicides, insecticides, rodenticides,  
740 piscicides, and fungicides—to serve a variety of management objectives such as controlling invasive  
741 species and supporting crop production to provide forage for waterfowl. However, pesticides may also  
742 potentially threaten vulnerable species and habitats as well as the health and safety of Service staff and  
743 the public who may be exposed to harmful chemicals through drift, runoff, or direct exposure.  
744 Consistent with Department of the Interior and Service policy, we take all reasonable steps to minimize



745 or, when feasible, eliminate the use of and dependence on chemical pest control treatments. Refuge  
746 Managers may only allow pesticide use on refuges in the interest of our conservation mission when  
747 necessary to meet statutory requirements, fulfill refuge purposes and ensure BIDEH.

748  
749 **(1)** Given the growing record of scientific evidence documenting the potential harm to imperiled and  
750 sensitive species from exposure to certain chemicals, we avoid pesticide application that may adversely  
751 affect the biological function or viability of nontarget populations of fish, wildlife, and plants on refuges  
752 (considering potential impacts at the population rather than the individual level). For example, we  
753 generally prohibit the use of pesticides such as neonicotinoid insecticides and the herbicide dicamba,  
754 which are proven to cause adverse effects on populations of nontarget species. We aim to prevent  
755 negative impacts to pollinators, birds, and aquatic species that are particularly vulnerable to pesticide  
756 use.

757  
758 **(2)** In addition to only being allowed when necessary to meet statutory requirements, fulfill refuge  
759 purposes and ensure BIDEH, pesticides may only be applied on refuge habitats in strict conformance  
760 with an integrated pest management plan and the Federal Insecticide, Fungicide, and Rodenticide Act,  
761 as well as other relevant laws, regulations, and policies. Refuge staff may only use those pesticides  
762 and applications approved for use in the Refuge System through the Pesticide Use Proposal System  
763 (PUPS) database. For more information, see [569 FW 1](#), Integrated Pest Management, and [242 FW 7](#),  
764 Pesticide Users Safety.

765  
766 **F. Agricultural use.** We implement agricultural practices on the Refuge System only where we cannot  
767 meet our wildlife management objectives or legal requirements through maintenance, management,  
768 restoration, or mimicking of natural ecosystem processes or functions. We generally do not allow refuge  
769 uses or management practices that result in the maintenance of artificial monocultures. Accordingly, we  
770 prohibit agricultural use, including the use of cooperative agriculture, unless the Refuge Manager  
771 determines that we cannot achieve refuge management objectives through natural processes, and it is  
772 necessary to meet statutory requirements, fulfill refuge purposes, and ensure BIDEH. Agricultural use  
773 that involves pesticides or GEOs is prohibited except in rare situations in accordance with sections  
774 3.13(E) and 3.13(C)(2) along with additional applicable policy and regulatory requirements.

775  
776 **(1)** Agricultural practices, such as crop cultivation, haying, grazing, or the harvest of vegetative  
777 products, may vary from refuge to refuge along with the techniques used to conduct these practices.  
778 For example, some refuges grow corn or other grain to provide food for migratory birds when natural  
779 processes are insufficient, while other refuges use farming in rotation with moist-soil management  
780 techniques that mimic natural wetlands to support birds and other species. When we conduct or  
781 authorize agriculture as a conservation tool in accordance with [620 FW 2](#), Cooperative Agricultural Use,  
782 and other applicable legal requirements, we must ensure that it is informed by the best available  
783 scientific information, fully evaluated on a case-by-case basis, and implemented only when it benefits  
784 fish and wildlife conservation, enhances BIDEH, and supports 620 FW 1.

785  
786 **(2)** Where we do not need to use farming or other agricultural practices to meet statutory requirements,  
787 fulfill refuge purposes, and ensure BIDEH, we appropriately cease the activity in accordance with any  
788 legal agreements and requirements, and strive to restore the location to native habitats.

789  
790 **G. Mosquito control.** Native mosquitoes are a natural part of refuge ecosystems. Unless they interfere  
791 with refuge-specific management goals and objectives or cause a public or wildlife health risk, native  
792 mosquitoes are allowed to exist unimpeded on refuge habitats.

793  
794 **(1)** We generally prohibit mosquito control except when necessary to meet statutory requirements, fulfill  
795 refuge purposes, and ensure BIDEH, or to protect human health and safety. If we must use mosquito

796 control, the methods chosen must be the least injurious to fish, wildlife, and their habitats.

797

798 **(2)** The primary public health concern associated with mosquitoes on refuges is mosquito-vectored  
799 pathogens that cause disease. When faced with such issues, we may coordinate with public health  
800 agencies or mosquito control organizations to implement the most effective methods for controlling  
801 mosquitoes that minimize risk to refuge ecosystems and public health, with a preference for use of non-  
802 pesticide-based tools. In this way we protect both human and wildlife health while mitigating potential  
803 detrimental effects of mosquito control on refuge ecosystems. The Service's [Handbook for Mosquito](#)  
804 [Management on National Wildlife Refuges](#) and [569 FW 1](#) provide additional information regarding our  
805 science-based approach to mosquito control.

806

### 807 **3.14 How does the Service make management decisions to maintain, restore, and enhance** 808 **BIDEH?**

809

810 **A. BIDEH authorities.** We comply with all legal mandates, including our BIDEH regulations at 50 CFR  
811 29.3 (*under development*), follow the principles under [section 3.9](#) of this policy, apply the management  
812 directives under [section 3.10](#), consider the factors under [section 3.11](#), comply with the requirements  
813 under [section 3.13](#), and conduct peer review as prescribed in this section. This means that all  
814 management activities and uses are subject to the underlying conservation principle that defers to  
815 natural processes and favors management that mimics natural processes, that we base our  
816 management decisions on sound professional judgment and the best available science, that we  
817 account for climate change and other anthropogenic change, and that management actions must  
818 benefit wildlife conservation by contributing to the BIDEH of the Refuge System.

819

820 **B. Integration of other authorities.** We follow applicable legal requirements and policy direction prior  
821 to implementing a management activity, including consideration of obligations arising from treaties  
822 between Indian tribes and the United States, conducting NEPA analysis, compatibility determinations,  
823 and ESA consultation when required.

824

825 **(1)** We evaluate the necessity for and potential environmental effects of a proposed management  
826 activity in accordance with NEPA, as appropriate. NEPA analysis may occur either as part of a refuge's  
827 Comprehensive Conservation Plan (CCP), other approved management plan, or standalone review.

828

829 **(2)** All management activities and uses must be consistent with a refuge's CCP. We integrate the  
830 principles and directives of this policy into comprehensive conservation planning, including step-down  
831 planning and land protection planning, as we direct long-range refuge management and identify desired  
832 future conditions for refuges (see our planning policies at 602 FW 1-4). Our CCPs include goals that  
833 ensure refuge management maintains and, when necessary and appropriate, restores and enhances  
834 the BIDEH of the Refuge System.

835

836 **(3)** We require compatibility determinations for refuge management economic activities such as certain  
837 agricultural practices that generate commodities, as well as activities that involve use of a refuge by the  
838 public or other non-Refuge System entity. When completing compatibility determinations, Refuge  
839 Managers use sound professional judgment to determine if a refuge use will materially interfere with or  
840 detract from the fulfillment of the Refuge System mission or the purpose(s) of the refuge. Protecting  
841 BIDEH is inherent in fulfilling both. See [603 FW 2](#), Compatibility, and regulations at 50 CFR parts 25,  
842 26, and 29 for further information on compatibility determinations.

843

844 **C. Peer review.** We require a formal peer review proposal prior to approving refuge management  
845 actions if they use precedent-setting methods or models, are of high ecological risk or controversy, are  
846 likely to change prevailing practices, or are likely to affect policy decisions of significant environmental

847 impact. The impetus for peer review is commensurate with the level of risk and controversy inherent to  
848 the proposed activity. The peer review process informs refuge management by critiquing whether such  
849 proposed action is warranted, effective, and consistent with the best available science, and whether it  
850 avoids unintended ecological consequences. It provides a meaningful, scientific evaluation for Refuge  
851 Managers to rely on in determining whether the proposed action is necessary to meet statutory  
852 requirements, fulfill refuge purposes, and ensure BIDEH. Peer review may be integrated with, or occur  
853 separately from, an ecological risk assessment. Notably, refuges that seek to conduct predator control,  
854 use genetically modified organisms, or introduce species outside their historical range will typically be  
855 required to develop a peer review proposal unless the proposed activity has previously undergone such  
856 scientific review within the past 10 years and no substantial and ensuing changes in scientific  
857 knowledge or relevant circumstances have occurred that could alter the prior analysis.  
858

859 **(1)** We consult with the Refuge System's Headquarters office to organize and manage a consistent  
860 peer review approach. The peer review proposal must describe the management objectives, rationale,  
861 methods, monitoring protocols, reporting requirements, and budget for the proposed action, including  
862 an assessment of potential ecological consequences and project sustainability, using the best available  
863 scientific information. At least three independent subject matter experts must conduct the peer review  
864 to evaluate the proposed methodology as well as the action's suitability and feasibility for addressing  
865 the conservation concern. The peer review process is publicly disclosed, highlighting the quality of  
866 Government work while promoting public confidence. For additional information on how to select and  
867 conduct an appropriate peer review mechanism for actions taken under this policy, refer to the Office of  
868 Management and Budget bulletin, [Final Information Quality Bulletin for Peer Review](#), 70 Fed. Reg.  
869 2664 (January 14, 2005).  
870

871 **(2)** Refuge Managers do not cede their decision-making authority to peer reviewers. Peer review  
872 advises refuge management, with the accountable leader(s) making the final decisions on the proposal  
873 based on the outcome of the peer review and the considerations explained in this policy.  
874

875 **D. BIDEH balance.** We strive to make management decisions in a holistic manner, balancing fulfillment  
876 of refuge purposes with maintenance of BIDEH. In the requirements for administering the Refuge  
877 System under the National Wildlife Refuge System Improvement Act of 1997, Congress elevated  
878 ensuring the maintenance of BIDEH to a similar level of importance as ensuring the mission of the  
879 System and the purposes of each refuge are carried out. We therefore implement these integral  
880 mandates together to provide the greatest conservation benefits for fish and wildlife.  
881

882 **(1)** In the rare instance that a conflict arises between fulfilling refuge purposes and ensuring BIDEH, we  
883 seek to maintain and, where necessary and appropriate, restore and enhance BIDEH to the maximum  
884 extent possible while pursuing refuge purposes. This means that at times we may have to augment,  
885 limit, or adjust our actions intended to fulfill refuge purposes to avoid long-term damage to BIDEH on a  
886 refuge or the Refuge System. Similarly, at times we may have to compromise elements of BIDEH in  
887 pursuit of refuge purposes to support those elements at larger spatial scales, particularly when  
888 addressing the impacts of climate change or other anthropogenic change. For example, a refuge whose  
889 purpose is to conserve an imperiled species may find that implementing actions that protect that  
890 species reduces biological diversity at the refuge scale, but contributes to biological diversity at the  
891 landscape scale.  
892

893 **(2)** We balance the interconnected elements of BIDEH by considering refuge purposes, the Refuge  
894 System mission, multiple spatial scales, and response to environmental change. The primary  
895 mechanism we use to determine this balance is through the refuge planning processes. If BIDEH,  
896 refuge purposes, or the Refuge System mission are considered independently or without anthropogenic  
897 change and ecological transformation in mind, strategies to conserve and manage BIDEH may

898 otherwise conflict or fail to meet conservation challenges. For example, we may use dikes and water  
899 control structures to mimic natural hydrological cycles or use rotenone to eliminate invasive carp from a  
900 pond to restore aquatic ecosystems. Such physical structures and chemical applications would  
901 compromise environmental health if considered in isolation, but they may be appropriate management  
902 actions for maintaining, restoring, or enhancing biological integrity and diversity overall.  
903

904 **3.15 How does the Service protect BIDEH from actions outside of refuges?** Recognizing that  
905 refuges are integral parts of the larger landscape, and to support our wildlife conservation mission, we  
906 must work cooperatively with others to anticipate, avoid, and resolve potential conflicts; protect refuge  
907 resources; and address mutual interests in providing compatible wildlife-dependent recreational  
908 opportunities. Such cooperative conservation activities are vital to establishing relationships that will  
909 benefit the refuge and uphold BIDEH. In addition, we must use all available tools to protect refuge  
910 resources from unacceptable impacts.  
911

912 **A.** Events occurring off refuge lands or waters may injure or destroy BIDEH on a refuge. Refuge  
913 Managers must regularly monitor land use proposals, changes to adjacent lands, and external activities  
914 for their potential impacts to the BIDEH of ecosystems that include refuges. It is appropriate for Refuge  
915 Managers to engage constructively with the broader community in the same way that any good  
916 neighbor would. Refuge Managers should encourage compatible adjacent land uses and seek to avoid  
917 and mitigate potential adverse impacts on refuge resources by actively participating in the planning and  
918 regulatory processes of other Federal agencies and Tribal, State, and local governments having  
919 jurisdiction over public or private property affecting, or affected by, the refuge.  
920

921 **B.** If the above efforts have failed and a decision is made or is imminent that will result in unacceptable  
922 impacts on refuge resources, we may take action within the legal authorities available to the Service.  
923 Refuge Managers and Regional Refuge Chiefs must consult with the Office of the Solicitor for  
924 assistance in identifying appropriate remedies and obtain concurrence from the Regional Director on  
925 such actions.