Helpful Tips for Reading the Fact Sheets

1. Fact sheets are included for Oregon's 10 existing Mid-C steelhead populations and the non-essential, experimental [ESA 10(j)] Upper Deschutes-Crooked River population since reintroduction and passage efforts above Pelton-Round Butte Complex aim to restore steelhead to their historically accessible areas {see Figure ES-1 (page 1) and Figure 1 (page 4) for population delineations}.
2. **2016 status** refers to an existing (extant) population's viability status, defined as probabilities of extinction risk over a 100-year time period, and based on the 2016 NMFS 5-year status review[3] of four viability criteria:
   - ***Abundance***—the average number of naturally produced spawners in a population over a generation or more;
   - ***Productivity***—performance of a population over time in terms of recruits per spawner;
   - ***Spatial structure***—a population's geographic distribution and the processes that affect that distribution; and
   - ***Diversity***—the distribution of genetic, life history, and phenotypic variation within and among populations.
3. **Population status & trends** figures summarize abundance, hatchery proportion, and recruits per spawner raw data.
   - The **abundance** graph displays the smoothed trend of estimated annual natural-origin spawner (light blue shaded area) and total spawner data (natural- and hatchery-origin; dark blue shaded area), the recovery minimum natural-origin spawner (NOSA) abundance threshold (black dashed line), and 10-year rolling geometric mean of natural-origin spawners (orange trendline).
     – Unlike the traditional average (arithmetic mean), the geometric mean (geomean) is used because it tends to dampen the effect of very high or low values in the dataset.
   - The **hatchery proportion** graph displays the annual raw data (red squares) and trend (dashed line) estimates, 5-year rolling average proportion of hatchery-origin spawners (pHOS) data (tan trendline), and the HSRG's recommended population-specific thresholds for low-risk hatchery influence (black dashed line). pHOS provides a measure of the population's genetic diversity risk[4].
   - The **adult recruits per spawner (R/S)** graph displays annual raw data (purple points and trend), 20-year rolling geometric mean estimates (green trendline), population replacement threshold (R/S=1; gray dotted line), and recovery minimum productivity threshold (black dotted line)[5]. R/S is a measure of population productivity or growth rate. Values above replacement (R/S>1) indicate a growing population; values less than one indicate that the population did not replace the number of parents in that brood year[5].
   - Conservation and Recovery Plan **viability thresholds** (e.g., abundance and productivity) start at **1999**, the year Mid-C steelhead were ESA-listed as threatened.
   - Data is available on ODFW's Salmon and Steelhead Recovery Tracker[6] (http:/odfwrecoverytracker.org/) and StreamNet's Coordinated Assessments Data Exchange (http://cax.streamnet.org/) websites. Population-specific viability criteria data collection and analysis methods are further described in Carmichael et al. 2015[7].
4. **Primary threats and limiting factors** are summarized for each population. Addressing primary threats is the highest priority for improving a population's viability and meeting recovery goals. Consequently, secondary threats (e.g., harvest, predation, etc.) are not presented in the fact sheets. An asterisk (*) indicates new primary threats and/or limiting factors based on research and monitoring evidence.
5. **Actions implemented** to addresses the primary threats are summarized in the narrative, graphs, and tables for each population.
   - A recovery **strategy** is a management objective designed to address specific threats and factors limiting the Middle Columbia steelhead viability and achieve the recovery goals of establishing naturally self-sustaining, abundant, productive, and diverse populations.
   - A recovery **action** is the specific management practice or policy required in a specified geographic area to close the gap between current conditions and full achievement of a recovery strategy.
   - A **project** is a completed activity or suite of activities implemented to achieve a particular protection and/or restoration purpose. Multiple projects may address a single recovery plan action.
   - Mainstem Columbia River **hydrosystem** passage and operations remain a primary threat impacting all of Oregon's Mid-C Steelhead populations. Detailed information regarding this threat is provided on pages 39-40.
   - The **research, monitoring, and evaluation (RM&E)** bar graph and text box summarize the status of Oregon's Mid-C Plan RM&E actions implemented as of December 2016.
     – **RM&E Status**: ***Fully Implemented*** 🟢 = RM&E objective is fully funded and executed to evaluate associated monitoring questions; ***Partially Implemented*** 🟡 = RM&E objective is active, but only partially funded and executed to evaluate associated monitoring questions; ***Not Started*** 🔴 = implementation of the RM&E objective is neither funded nor started to date.
     – **Appendix A** tables provide a detailed summary of the RM&E objectives, monitoring questions, and status in terms of current efforts, new work added, future work planned, and/or remaining implementation gaps for each population.
   - **Tributary habitat** pie charts were developed from the **Appendix B** tables that summarize habitat protection and restoration activities completed January 2010 through December 2016 for each population and their relationship to recovery actions and strategies identified in the plan. Many of the habitat recovery actions are defined at the HUC10 or watershed scale in the plan, therefore multiple projects may address the same recovery action. Additionally, many projects require long-term maintenance to ensure their implementation success. The habitat tables and graphs reflect the best available information from existing reporting databases, state/tribal/federal agency staff, and local restoration practitioners.
   - Where applicable, **tributary hydrosystem** and **hatchery** text boxes describe the implementation status of high priority strategic actions to address tributary hydrosystem and hatchery influence limiting factors for a population(s).
6. **Major population group (MPG)** summaries describe priority recovery gaps and management recommendations for each MPG.

Lower Mainstem John Day River Summer Steelhead

Population Status & Trends

- 2016 Status: **Maintained** (moderate, 6-25%, extinction risk)[3]; wild population
- The recent 10-year geomean natural origin abundance estimate of **1,720** (range 840—3,563, Spawning Years 2007—2016) is **below** the minimum abundance threshold of 2,250 spawners for low risk extinction (Figure 33)[1,6].
- During 2012-2016, hatchery strays accounted for an average of **8%** of total natural spawners (range 4% - 13%) which is **above** the HSRG's low risk hatchery-origin spawner threshold of 5% for a primary population (Figure 34)[4,6].
- The recent 20-year geomean recruits per spawner estimate is **1.12** (range 0.08—6.78, Brood Years 1991—2010); **above** population replacement (R/S=1) **and below** the minimum threshold for recovery (R/S =1.19; Figure 35)[1,5,6].
- **New Information**: Approximately 53% of PIT-tagged John Day wild steelhead adults migrating through the FCRPS swam past the John Day River and were detected above McNary Dam; less than 50% of these steelhead successfully migrated back downstream to the John Day River to spawn[32-34] (see pages 39-40 for more information). Recent pHOS declines are correlated to reductions of barge transported Snake River steelhead smolts[32]. Monitoring evidence indicates that juvenile summer steelhead rearing habitat is limited throughout the John Day Basin due to high stream temperatures and low instream flow conditions[32].

Figure 33. Natural Spawning Abundance

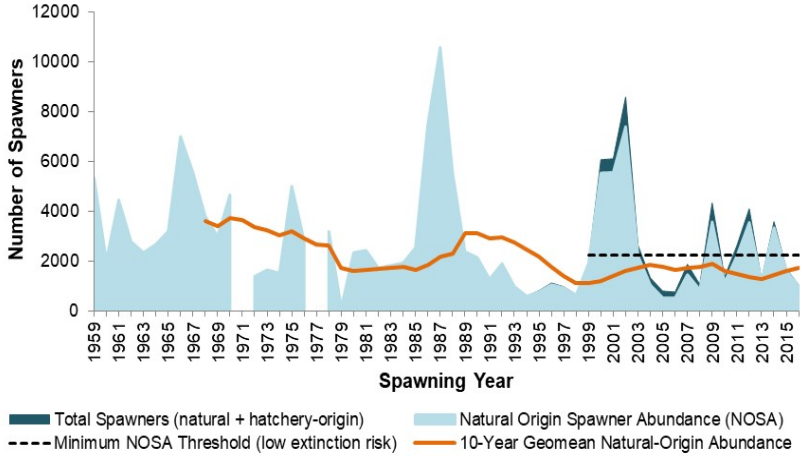


Figure 34. Hatchery Proportion of Natural Spawners

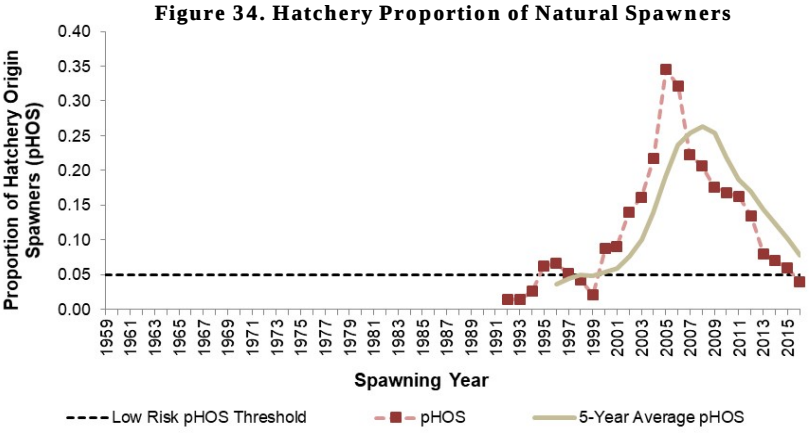
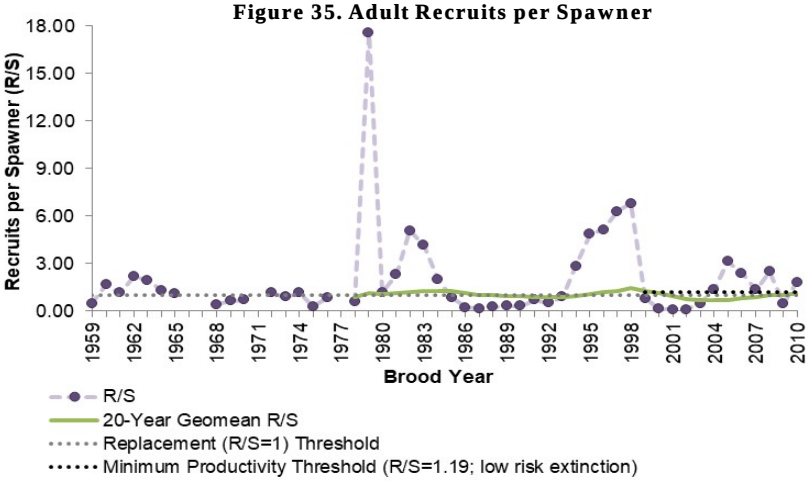


Figure 35. Adult Recruits per Spawner



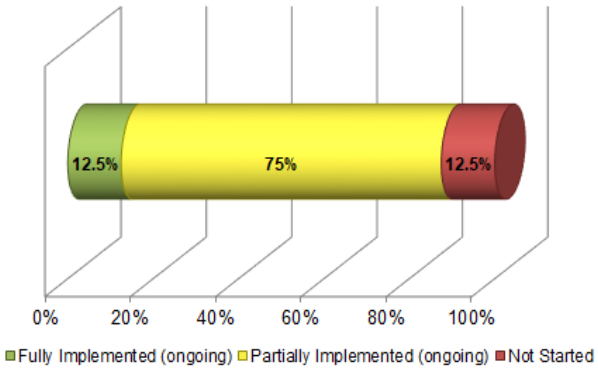
Revised Primary Threats & Factors Limiting Population Viability[1]

Hydrosystem: Mainstem Columbia River passage and facility operations; *tributary overshoot (adult returns)

Tributary Habitat: Degraded channel structure and complexity (habitat quantity and diversity), altered sediment routing, degraded water quality (water temperatures), and altered hydrology (low flows). Impaired fish passage is also a high priority limiting factor in Bridge, Butte, Kahler, Muddy, Rock and Thirtymile Creeks

Hatchery: Effects of naturally spawning stray hatchery fish on viability of wild fish

Figure 36. RM&E Action Status: 2010-2016



Research, Monitoring, & Evaluation (RM&E): 2010-2016

- The plan specifies **eight** RM&E recovery actions for the Lower Mainstem John Day steelhead population[1]. **~13%** (n=1) were fully funded and implemented as of December 2016; **75%** (n=6) were partially implemented and **~13%** (n=1) not started (Figure 36).
- **Seven** RM&E actions are ranked high/highest priority in the plan. Only **one** of these was fully implemented.
- Critical **monitoring gaps**:
  - CHaMP monitoring occurred during 2011-2012. As of 2013, there is no monitoring at the population scale. Funding is needed to fully implement the high/highest priority population viability, out of basin hatchery strays, habitat status/trend, and effectiveness monitoring objectives (Objectives 1-6 & 8, Appendix A, Table A-4).
- See **Appendix A, Table A-4** for detailed RM&E action status information.

Tributary Habitat Protection & Restoration Actions: 2010—2016

- **361** tributary habitat strategic recovery actions are identified in the plan for the Lower Mainstem John Day steelhead population[1]. **83** actions (**23%**) were implemented through multiple projects during January 2010—December 2016.
- **~457** partners, including private landowners, implemented an estimated **442** habitat projects in the population area. **72%** (n=318) of the projects had a nexus to one or more recovery plan actions (Figure 37); **71%** (n=227) of the plan-nexus projects implemented high/highest priority recovery actions (Figure 38) and of these, **63%** (n=143) occurred in high protection and/or restoration benefit areas (Figure 39).
- Predominant recovery plan strategies implemented: **Strategy 5** - restoring riparian condition and LWD recruitment; **Strategy 8** - restoring upland processes to minimize erosion; **Strategy 2** - restoring passage and connectivity to habitats; and **Multiple Strategies** (combinations of strategies 1-8) (Figure 40). This is mostly consistent with the plan's highest priority tributary habitat recovery strategies (1, 2, 4, 5, and 6) for the population[1].
- **Implementation highlights**:
  - ~48 high priority fish passage barriers improved (~261 stream miles made accessible) and 38 high priority fish screens installed in the Bridge, Butte, Lonerock, Mountain, Rock, and Thirtymile Creek watersheds (Strategy 2).
  - ~1,888 riparian acres, ~177 riparian land miles, and ~46 linear stream miles protected/improved through conservation easement adoption and riparian restoration in the Bridge, Butte, Mountain, and Thirtymile Creek watersheds (Strategy 5).
  - Upland vegetation planting, juniper management, invasive weed control, and rotational grazing management in Bridge, Butte, and Thirtymile Creek watersheds (Strategy 8).
  - Channel form, instream habitat complexity, floodplain connectivity, and/or instream restoration in the Bridge, Pine Mountain, and Thirtymile Creek watersheds (Strategies 1, 3-6).
  - A GPS-referenced, habitat limiting factor watershed assessment was completed for Mountain Creek in 2011[35].
- **Critical gaps**:
  - There is insufficient data at this time to adequately assess whether restoration projects completed thus far have improved steelhead habitat quantity and quality, and population viability. Due to funding limitations, CHaMP monitoring only occurred in 2011-2012; GRTS-based population scale sampling ended in 2013; and the Bridge Creek IMW will end in 2017. RM&E efforts need to be expanded and additional funding secured to better evaluate population status/trends, habitat condition, habitat restoration effectiveness, and identify relationships between fish and habitat use at the population/watershed scale (Objectives 3 and 8 in **Appendix A, Table A-4**).
- See **Appendix B, Table B-5** for a summary of completed habitat projects and associated treatment metrics.

Figure 37. Completed Habitat Projects

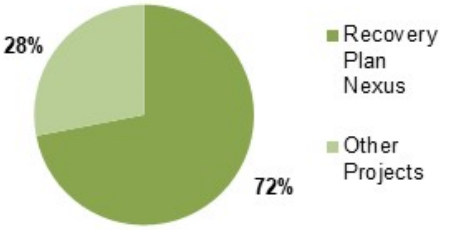


Figure 38. Recovery Plan Actions Addressed

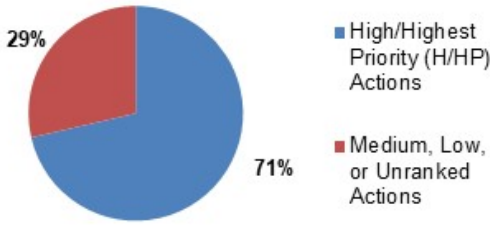


Figure 39. High Priority Plan Actions Implemented in Recovery Benefit Areas

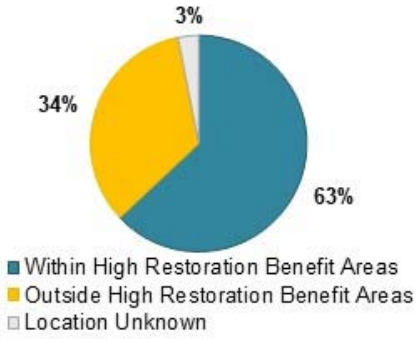
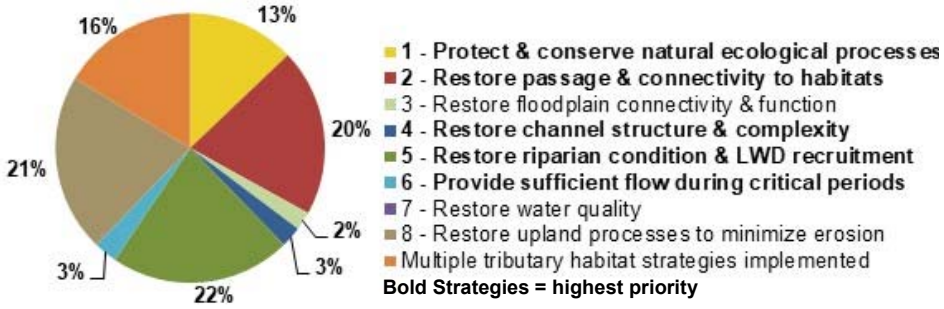


Figure 40. Recovery Plan Strategies Implemented: 2010—2016



Tributary Actions to Reduce Out-of-Basin Hatchery Origin Strays Spawning Naturally: 2010—2016

The plan recommends two actions, one harvest and one hatchery, to address threats to John Day River summer steelhead from out-of-basin hatchery origin strays[1]: **Harvest Action** - Develop an education program to promote the use of selective recreational fisheries and retention of all hatchery fish caught to reduce the number of out-of-basin hatchery strays; **Hatchery Action** - Increase efforts to monitor the incidence of hatchery fish on spawning grounds through additional stream surveys and other methods.

Current Status = Partially Implemented. Recent declines in the proportion of out-of-basin hatchery strays correlate with reduced barge transportation (<30%) of Snake River hatchery steelhead smolts[32]. However, pHOS remains above the 5% low risk threshold for the Lower Mainstem John Day population[4]. Juvenile steelhead monitoring includes age at seaward migration and juvenile migration timing; adult monitoring includes migration timing and age composition at return. Creel surveys at the MPG-scale were initiated in 2013. Due to limited funding, there is no adult monitoring of out-of-basin hatchery influences at the population scale. Full funding of RM&E Objective 5 is needed to expand study design and enhance monitoring efforts of hatchery influence on Lower Mainstem John Day steelhead viability (Objective 5, **Appendix A, Table A-5**).

North Fork John Day River Summer Steelhead Population

Population Status & Trends

- 2016 Status: **Highly Viable** (very low, <1%, extinction risk)[3]; wild population
- The recent 10-year geomean natural origin abundance estimate of **2,094** (range 860—4,588, Spawning Years 2007—2016) is **above** the minimum abundance threshold of 1,500 spawners for low risk extinction (Figure 41)[1,6].
- During 2012—2016, hatchery strays accounted for an average of **1%** of total natural spawners (range 1% - 2%) which is **below** the HSRG's low risk hatchery-origin spawner threshold of 5% for a primary population (Figure 42)[4,6].
- The recent 20-year geomean recruits per spawner estimate is **1.22** (range 0.17—3.89, Brood Years 1991—2010); **above** population replacement (R/S=1) **and below** the minimum threshold for recovery (R/S =1.26; (Figure 43)[1,5,6].
- **New Information**: Approximately 53% of PIT-tagged John Day wild steelhead adults migrating through the FCRPS swam past the John Day River and were detected above McNary Dam; less than 50% of these steelhead successfully migrated back downstream to the John Day River to spawn[32-34] (see pages 39-40 for more information). Recent pHOS declines are correlated to reductions of barge transported Snake River steelhead smolts[32]. Monitoring evidence indicates that juvenile summer steelhead rearing habitat is limited throughout the John Day Basin due to high stream temperatures and low instream flow conditions[32].

Figure 41. Natural Spawning Abundance

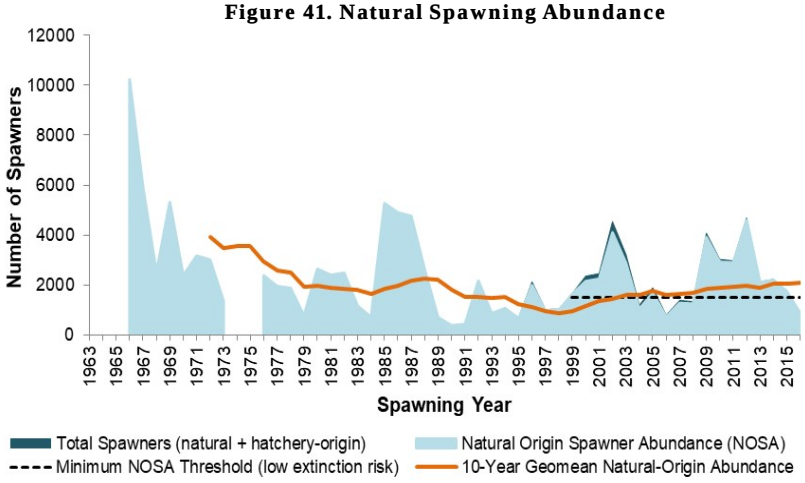


Figure 42. Hatchery Proportion of Natural Spawners

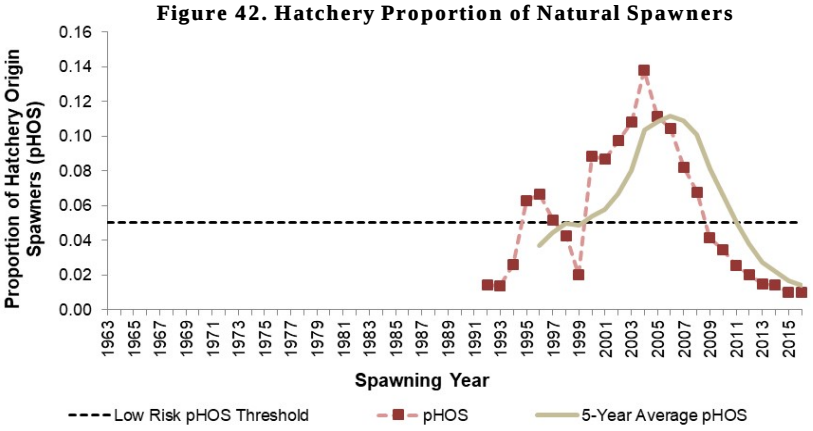
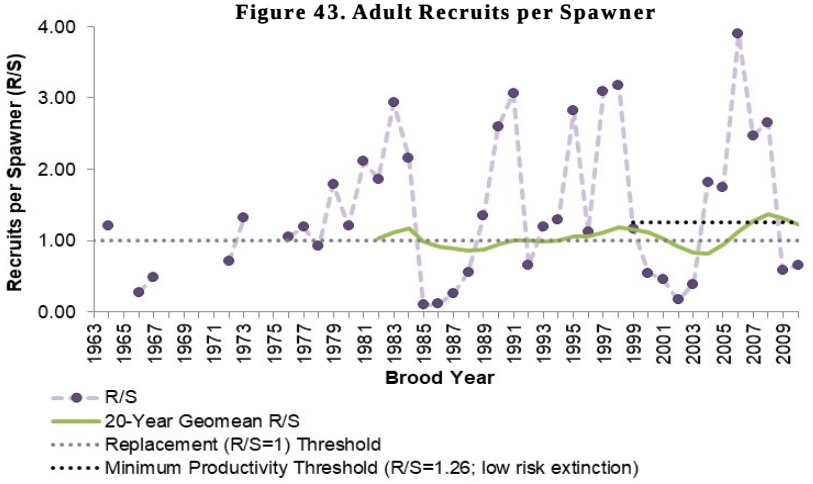


Figure 43. Adult Recruits per Spawner



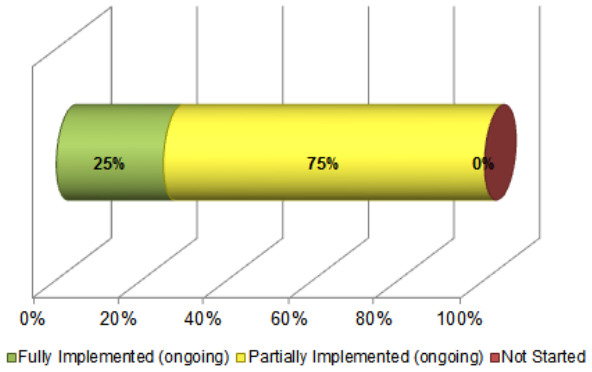
Revised Primary Threats & Factors Limiting Population Viability[1]

Hydrosystem: Mainstem Columbia River passage and facility operations; *tributary overshoot (adult returns)

Tributary Habitat: Degraded floodplain connectivity and function, degraded channel structure and complexity (key habitat quantity, habitat diversity, channel stability), altered sediment routing, degraded water quality (water temperatures), and altered hydrology (low flows)

Hatchery: Effects of naturally spawning stray hatchery fish on viability of wild fish

Figure 44. RM&E Action Status: 2010-2016



Research, Monitoring, & Evaluation (RM&E) Status: 2010-2016

- The plan specifies **eight** RM&E recovery actions for the North Fork John Day steelhead population[1]. **25%** (n=2) were fully funded and implemented as of December 2016; **75%** (n=6) were partially implemented and **0%** not started (Figure 44).
- **Seven** RM&E actions are ranked highest/high priority in the plan. Only **two** of these were fully implemented.
- Critical **monitoring gaps**:
  - CHaMP monitoring occurred during 2011-2012. As of 2013, there is no monitoring at the population scale. Funding is needed to fully implement the high/highest priority population viability, out of basin hatchery strays, habitat status/trend, and effectiveness monitoring objectives (Objectives 1-3, 5, 6 & 8, Appendix A, Table A-5).
- See **Appendix A, Table A-5** for detailed RM&E action status information.

Tributary Habitat Protection & Restoration Actions: 2010—2016

- **270** tributary habitat strategic recovery actions are identified in the plan for the North Fork John Day steelhead population[1]. **45** actions (**17%**) were implemented through multiple projects during January 2010—December 2016.
- **~165** partners, including private landowners, completed an estimated **130** habitat projects in the population area. **46%** (n=60) of the projects had a nexus to one or more recovery plan actions (Figure 45); **77%** (n=46) of the plan-nexus projects implemented high/highest priority recovery actions (Figure 46) and of these, **50%** (n=23) occurred in high protection and/or restoration benefit areas (Figure 47).
- Predominant recovery plan strategies implemented: **Strategy 2** - restoring passage and connectivity to habitats; **Multiple Strategies** (combinations of strategies 1, 2, 4-6 and/or 8); and **Strategy 8** - restoring upland processes to minimize erosion (Figure 48). This is somewhat consistent with the plan's highest priority tributary habitat recovery strategies (1, 4, 5, and 6) for the population[1].
- **Implementation highlights**:
  - A geomorphic evaluation and passage improvement assessment was completed for Lower Cottonwood Creek in 2013[36]. 7 barriers were improved for passage, 2 fish screens installed, 6 irrigation systems converted from ditch to pipeline delivery in Cottonwood Creek (Strategies 2, 6).
  - Fox-Cottonwood Creek system: conservation easement adopted on ~5,100 acres (Strategy 1); channel form and complexity treatments (LWD & boulder placement, pool construction, channel realignment) applied to ~1.25 instream miles instream (Strategy 4); leasing, exclusion fencing, vegetation planting of ~147 riparian acres and ~7.0 linear stream miles; and invasive weed control on 405 riparian acres and 38 linear stream miles; Fox Creek Restoration Plan completed in 2011[37] (Strategy 5).
  - Upland vegetation planting, juniper management, invasive weed control, and rotational grazing management applied throughout the population area (Strategy 8).
- **Critical gaps**:
  - There is insufficient data at this time to adequately assess whether restoration projects completed thus far have improved steelhead habitat quantity and quality, and population viability. Due to funding limitations, CHaMP monitoring only occurred in 2011-2012 and GRTS-based sampling ended in 2013. RM&E efforts need to be expanded and additional funding secured to better evaluate population status/trends, habitat condition, habitat restoration effectiveness, and identify relationships between fish and habitat use at the population/watershed scale (Objectives 3 and 8 in **Appendix A, Table A-5**).
- See **Appendix B, Table B-6** for a summary of completed habitat projects and associated treatment metrics.

Figure 45. Completed Habitat Projects

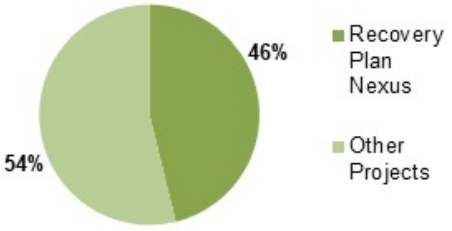


Figure 46. Recovery Plan Actions Addressed

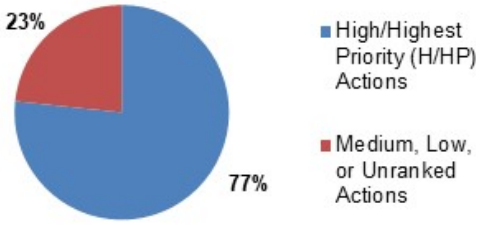


Figure 47. High Priority Plan Actions Implemented in Recovery Benefit Areas

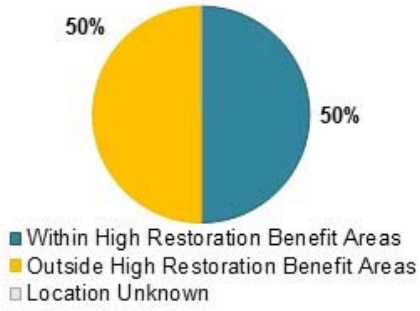
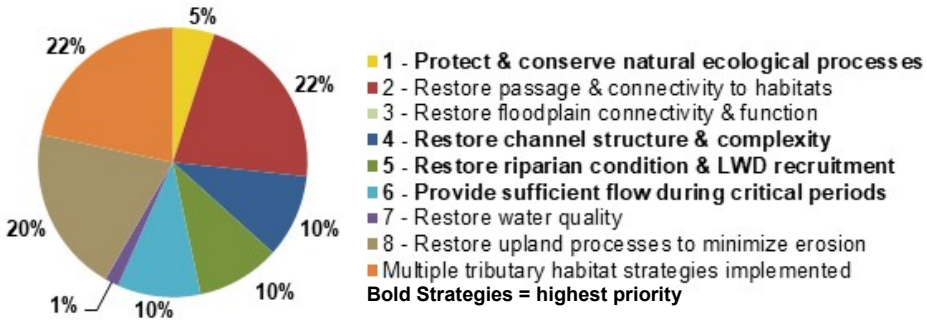


Figure 48. Recovery Plan Strategies Implemented: 2010—2016



Tributary Actions to Reduce Out-of-Basin Hatchery Origin Strays Spawning Naturally: 2010—2016

The plan recommends two actions, one harvest and one hatchery, to address threats to John Day River summer steelhead from out-of-basin hatchery origin strays[1]: **Harvest Action** - Develop an education program to promote the use of selective recreational fisheries and retention of all hatchery fish caught to reduce the number of out-of-basin hatchery strays; **Hatchery Action** - Increase efforts to monitor the incidence of hatchery fish on spawning grounds through additional stream surveys and other methods.

Current Status = Partially Implemented. Since 2009, the proportion of out-of-basin hatchery strays has remained below 5% and correlates with reduced barge transportation (<30%) of Snake River hatchery steelhead smolts[32]. Juvenile steelhead monitoring includes age at seaward migration and juvenile migration timing; adult monitoring includes migration timing and age composition at return. Creel surveys at the MPG-scale were initiated in 2013. Due to limited funding, there is no adult monitoring of out-of-basin hatchery influences at the population scale. Full funding of RM&E Objective 5 is needed to expand study design and enhance monitoring efforts of hatchery influence on North Fork John Day steelhead viability (Objective 5, **Appendix A, Table A-5**).

Middle Fork John Day River Summer Steelhead Population

Population Status & Trends

- 2016 Status: **Viable** (low, 1-5%, extinction risk)[3]; wild population
- The recent 10-year geomean natural origin abundance estimate of **2,986** (range 707—6,510, Spawning Years 2007—2016) is **above** the minimum abundance threshold of 1,000 spawners for low risk extinction (Figure 49)[1,6].
- During 2012-2016, hatchery strays accounted for an average of **1%** of total natural spawners (range 1% - 2%) which is **below** the HSRG's low risk hatchery-origin spawner threshold of 5% for a primary population (Figure 50)[4,6].
- The recent 20-year geomean recruits per spawner estimate is **1.45** (range 0.10—15.23, Brood Years 1991—2010); **above** population replacement (R/S=1) **and above** the minimum threshold for recovery (R/S =1.35; Figure 51)[1,5,6].
- **New Information**: Approximately 53% of PIT-tagged John Day wild steelhead adults migrating through the FCRPS swam past the John Day River and were detected above McNary Dam; less than 50% of these steelhead successfully migrated back downstream to the John Day River to spawn[32-34] (see pages 39-40 for more information). Recent pHOS declines are correlated to reductions of barge transported Snake River steelhead smolts[32]. A River Styles® assessment[38], a steelhead lifecycle and physical habitat model[39], and the 10-year Middle Fork Intensively Monitored Watershed Report[40] were completed for Middle Fork John Day River. Monitoring evidence indicates that juvenile summer steelhead rearing habitat is limited in the Middle Fork due to high stream temperatures and low instream flow conditions[32,39,40].

Figure 49. Natural Spawning Abundance

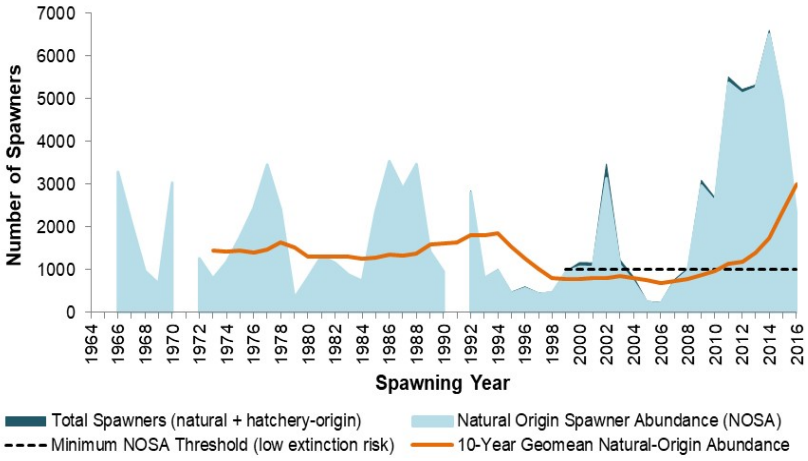


Figure 50. Hatchery Proportion of Natural Spawners

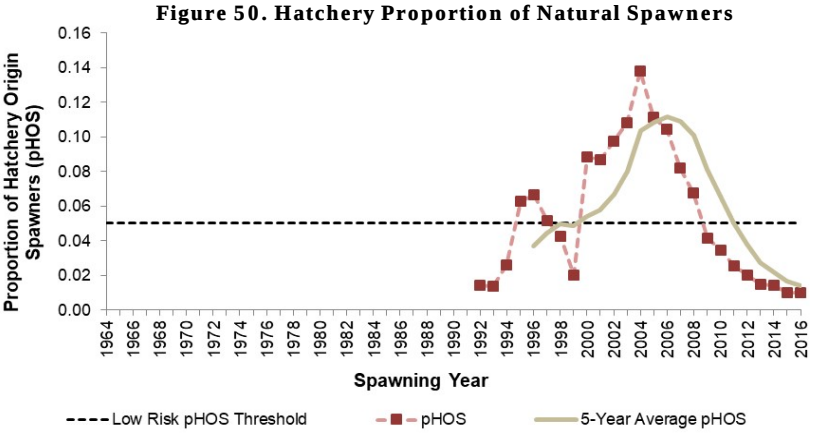
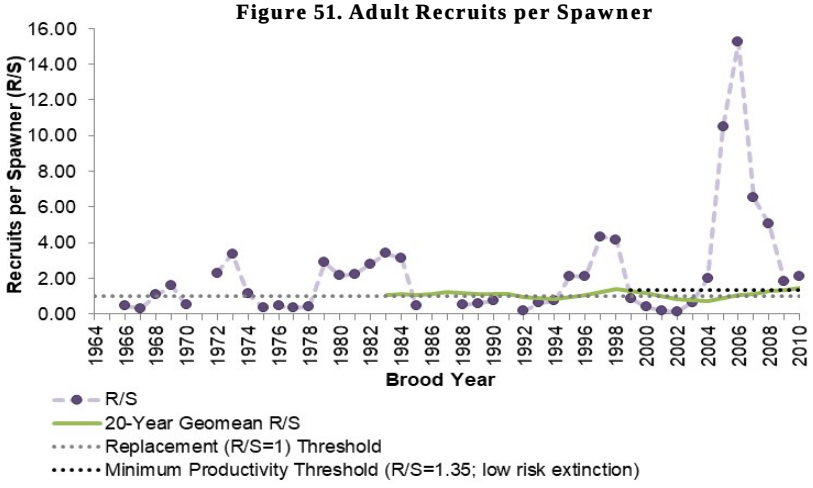


Figure 51. Adult Recruits per Spawner



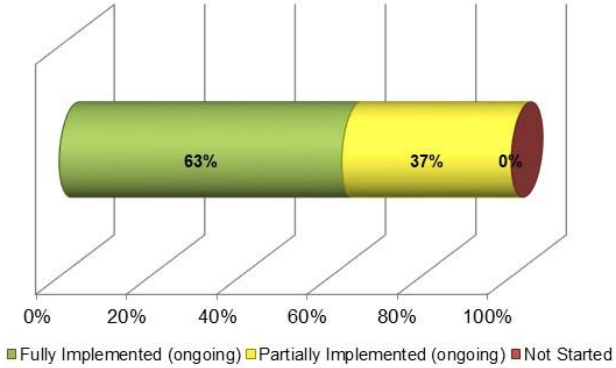
Revised Primary Threats & Factors Limiting Population Viability[1]

Hydrosystem: Mainstem Columbia River passage and facility operations; *tributary overshoot (adult returns)

Tributary Habitat: Degraded channel structure and complexity (habitat quantity and diversity), degraded floodplain connectivity and function, altered sediment routing, altered hydrology, and degraded water quality (water temperatures)

Hatchery: Effects of naturally spawning stray hatchery fish on viability of wild fish

Figure 52. RM&E Action Status: 2010-2016



Research, Monitoring, & Evaluation (RM&E): 2010-2016

- The plan specifies **eight** RM&E recovery actions for the Middle Fork John Day steelhead population[1]. **63%** (n=5) were fully funded and implemented as of December 2016; **37%** (n=3) were partially implemented and **0%** not started (Figure 52).
- **Seven** RM&E actions are ranked highest/highest priority in the plan; **five** of these were fully implemented.
- Critical **monitoring gaps**:
  - Additional funding is needed to expand RM&E efforts to better evaluate steelhead viability and status/trends of threats and limiting factors at the population scale (Objectives 1-5, 7, & 8, Appendix A, Table A-6).
- See **Appendix A, Table A-6** for detailed RM&E action status information.

Tributary Habitat Protection & Restoration Actions: 2010—2016

- **261** tributary habitat strategic recovery actions are identified in the plan for the Middle Fork John Day steelhead population[1]. **39** actions (**15%**) were implemented through multiple projects during January 2010—December 2016.
- **~69** partners, including private landowners, completed an estimated **121** habitat projects in the population area. **43%** (n=52) of the projects had a nexus to one or more recovery plan actions (Figure 53); **81%** (n=42) of the plan-nexus projects implemented high/highest priority recovery actions (Figure 54) and of these, **60%** (n=25) occurred in high protection and/or restoration benefit areas (Figure 55).
- Predominant recovery plan strategies implemented: **Strategy 2** - restoring passage and connectivity to habitats; **Strategy 5** - restoring riparian condition and LWD recruitment; **Strategy 8** - restoring upland processes to minimize erosion; and **Multiple Strategies** (combinations of strategies 3, 4, and/or 5)(Figure 56). This is somewhat consistent with the plan's highest priority tributary habitat recovery strategies (1, 4, 5, and 6) for the population[1].
- **Implementation highlights**:
  - 14 high priority culverts replaced (21.50 miles made accessible) in the Camp Creek watershed (HUC 1707020302); 3 high priority fish screens installed in the Granite Boulder Creek subwatershed (HUC 170702030203) (Strategy 2).
  - Continued leasing, exclusion fencing, revegetation of riparian areas, and grazing management practices applied resulting in ~1,100 riparian acres, ~190 riparian land miles, and ~17 linear stream miles treated/protected, and 13 off-channel water sources installed within the population area (Strategy 5).
  - Phases 1-5 of CTWSRO's Oxbow Mine Tailings Restoration Project completed to improve channel-floodplain-riparian habitat connectivity and complexity on the Middle Fork John Day and Granite Creek (~4 instream miles treated and ~128 riparian acres treated/protected) (Strategies 3, 4, and 5).
- **Critical gaps**:
  - There is insufficient data at this time to adequately assess whether restoration projects completed thus far have improved steelhead habitat quantity and quality, and population viability. CHaMP monitoring was initiated in 2011. As of 2012, GRTS-based sampling occurs semi-annually. Middle Fork Intensively Monitored Watershed (MFIMW) efforts are ongoing. However, future fish and habitat monitoring funding is uncertain. RM&E priorities include continued funding capacity to evaluate habitat condition, habitat restoration effectiveness, and relationships between fish and habitat use at the population/watershed scale (Objectives 3 and 8 in Appendix A, Table A-6).
- See **Appendix B, Table B-7** for a summary of completed habitat projects and associated treatment metrics.

Figure 53. Completed Habitat Projects

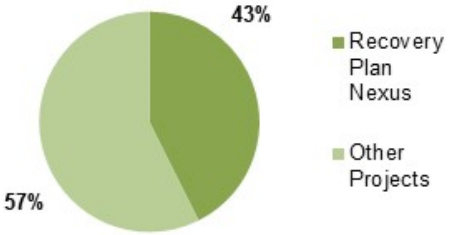


Figure 54. Recovery Plan Actions Addressed

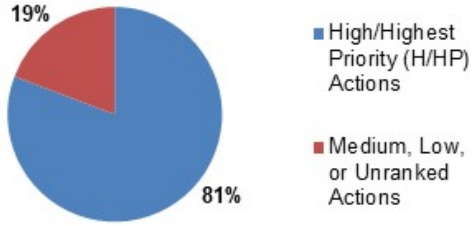


Figure 55. High Priority Plan Actions Implemented in Recovery Benefit Areas

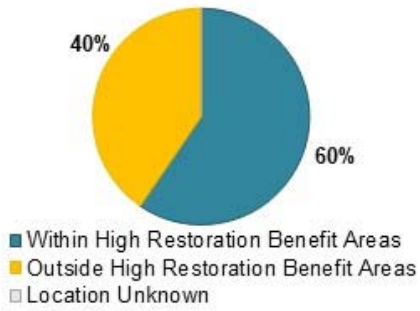


Figure 56. Recovery Plan Strategies Implemented: 2010—2016

Tributary Actions to Reduce Out-of-Basin Hatchery Origin Strays Spawning Naturally: 2010—2016

The plan recommends two actions, one harvest and one hatchery, to address threats to John Day River summer steelhead from out-of-basin hatchery origin strays[1]:
Harvest Action - Develop an education program to promote the use of selective recreational fisheries and retention of all hatchery fish caught to reduce the number of out-of-basin hatchery strays; **Hatchery Action** - Increase efforts to monitor the incidence of hatchery fish on spawning grounds through additional stream surveys and other methods.

Current Status = Partially Implemented. Since 2009, the proportion of out-of-basin hatchery strays has remained below 5% and correlates with reduced barge transportation (<30%) of Snake River hatchery steelhead smolts[32]. Juvenile steelhead monitoring includes age at seaward migration and juvenile migration timing; adult monitoring includes migration timing and age composition at return. Creel surveys at the MPG-scale were initiated in 2013. Due to limited funding, there is no adult monitoring of out-of-basin hatchery influences at the population scale. Full funding of RM&E Objective 5 is needed to expand study design to enhance monitoring efforts of hatchery influence on Middle Fork John Day steelhead viability (Objective 5, **Appendix A, Table A-6**).

South Fork John Day River Summer Steelhead Population

Population Status & Trends

- 2016 Status: **Viable** (low, 1-5%, extinction risk)[3]; wild population
- The recent 10-year geomean natural origin abundance estimate of **1,078** (range 416—2,057, Spawning Years 2007—2016) is **above** the minimum abundance threshold of 500 spawners for low risk extinction (Figure 57)[1,6].
- During 2012-2016, hatchery strays accounted for an average of **1%** of total natural spawners (range 1% - 2%) which is **below** the HSRG's low risk hatchery-origin spawner threshold of 5% for a primary population (Figure 58)[4,6].
- The recent 20-year geomean recruits per spawner estimate is **1.32** (range 0.23—6.90, Brood Years 1991—2010); **above** population replacement (R/S=1) **and below** the minimum threshold for recovery (R/S =1.56; Figure 59)[1,5,6].
- **New Information**: Approximately 53% of PIT-tagged John Day wild steelhead adults migrating through the FCRPS swam past the John Day River and were detected above McNary Dam; less than 50% of these steelhead successfully migrated back downstream to the John Day River to spawn[32-34] (see pages 39-40 for more information). Recent pHOS declines are correlated to reductions of barge transported Snake River steelhead smolts[32]. Monitoring evidence indicates that juvenile outmigrant (smolt) abundance remains high for the South Fork population. However, juvenile summer steelhead rearing habitat is limited throughout the John Day Basin due to high stream temperatures and low instream flow conditions[32].

Figure 57. Natural Spawning Abundance

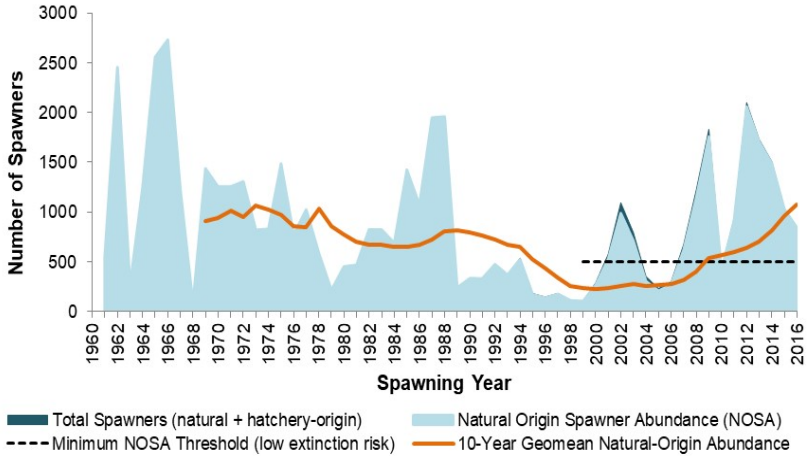


Figure 58. Hatchery Proportion of Natural Spawners

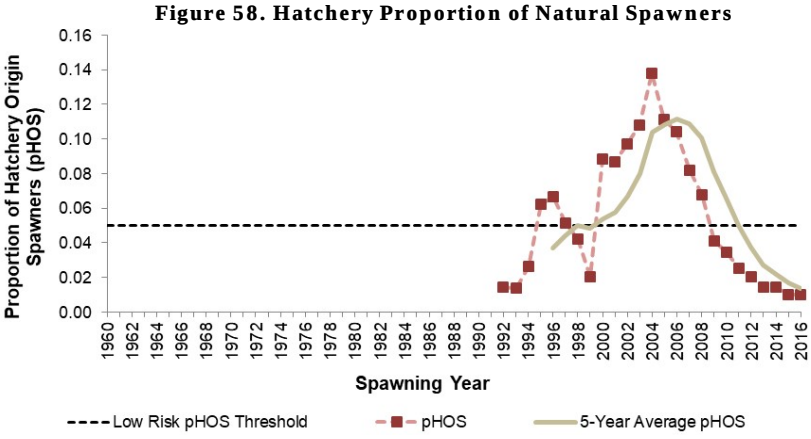
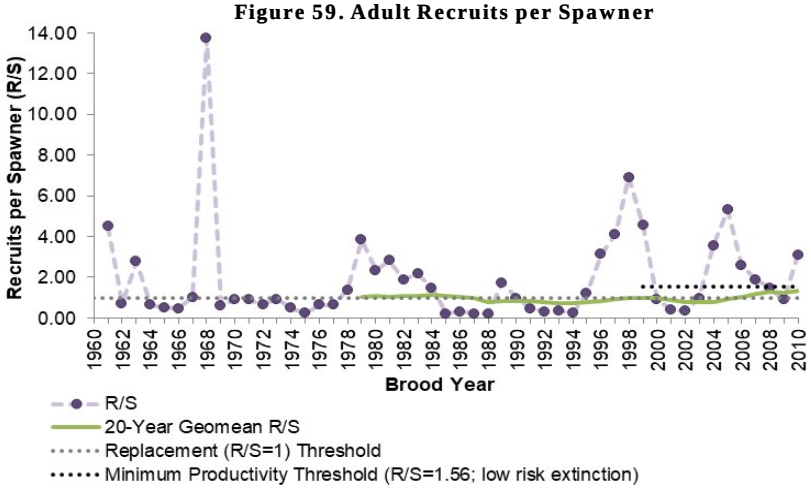


Figure 59. Adult Recruits per Spawner



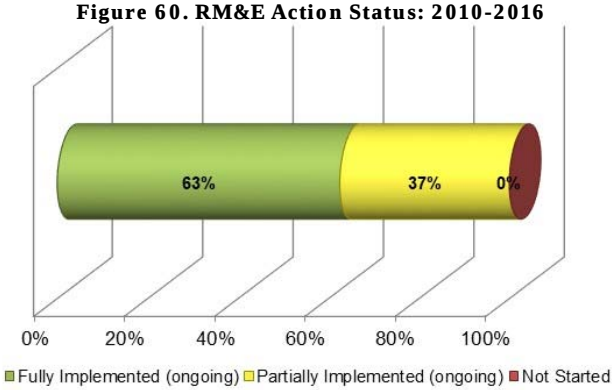
Revised Primary Threats & Factors Limiting Population Viability[1]

Hydrosystem: Mainstem Columbia River passage and facility operations; *tributary overshoot (adult returns)

Tributary Habitat: Altered sediment routing, degraded channel structure and complexity (habitat quantity and diversity), altered hydrology and low flow, degraded water quality (water temperatures), and

Hatchery: Effects of naturally spawning stray hatchery fish on viability of wild fish

Figure 60. RM&E Action Status: 2010-2016



Research, Monitoring, & Evaluation (RM&E): 2010-2016

- The plan specifies **eight** RM&E recovery actions for the South Fork John Day steelhead population[1]. **63%** (n=5) were fully funded and implemented as of December 2016; **37%** (n=3) were partially implemented and **0%** not started (Figure 60).
- **Seven** RM&E actions are ranked highest/highest priority in the plan; **five** of these are fully implemented.
- Critical **monitoring gaps**:
  - Additional funding is needed to expand RM&E efforts to better evaluate steelhead viability and status/trends of threats and limiting factors at the population scale (Objectives 1-5, 7, & 8, Appendix A, Table A-7).
- See **Appendix A, Table A-7** for detailed RM&E action status information.

Tributary Habitat Protection & Restoration Actions: 2010—2016

- **123** tributary habitat strategic recovery actions are identified in the plan for the South Fork John Day steelhead population[1]. **11** actions (**9%**) were implemented through multiple projects during January 2010—December 2016.
- **~49** partners, including private landowners, completed an estimated **43** habitat projects in the population area during 2010—2016. **72%** (n=31) of the projects had a nexus to one or more recovery plan actions (Figure 61); **87%** (n=27) of the plan-nexus projects implemented high/highest priority recovery actions (Figure 62) and of these, **37%** (n=10) occurred in high protection and/or restoration benefit areas (Figure 63). *Note: Protection/restoration priority benefit areas were not modeled above Izee Falls (RM 28 on the South Fork John Day) which is a natural barrier to steelhead upstream migration.*
- Predominant recovery plan strategies implemented: **Strategy 5** - restoring riparian condition and LWD recruitment and **Strategy 2** - restoring passage and connectivity to habitats (Figure 64). This is mostly consistent with the plan's highest priority tributary habitat recovery strategies (1, 3, 4, 5, and 6) for the population[1].
- **Implementation highlights**:
  - Riparian cooperative agreements/leases adopted, fencing installed, and riparian vegetation planted in the Murderers Creek watershed (~364 riparian acres, ~21 riparian land miles, ~6.7 linear stream miles treated/protected) and Lower South Fork John Day River watershed (~27 riparian acres, ~2.3 riparian land miles, ~0.7 linear stream miles, ~15 wetland acres treated/protected) (Strategies 1 and 5).
  - Four (4) high priority screens installed on diversions in the Lower South Fork John Day River (Strategy 2).
- **Critical gaps**:
  - There is insufficient data at this time to adequately assess whether restoration projects completed thus far have improved steelhead habitat quantity and quality, and population viability. GRTS-based sampling occurs semi-annually. CHaMP monitoring was initiated in 2011. Future funding capacity is uncertain. RM&E efforts need to be expanded and additional funding secured to better evaluate habitat condition, habitat restoration effectiveness, and relationships between fish and habitat use at the population/watershed scale (Objectives 3 and 8 in **Appendix A, Table A-7**).
- See **Appendix B, Table B-8** for a summary of completed habitat projects and associated treatment metrics.

Figure 61. Completed Habitat Projects

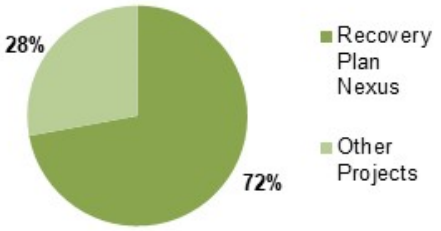


Figure 62. Recovery Plan Actions Addressed

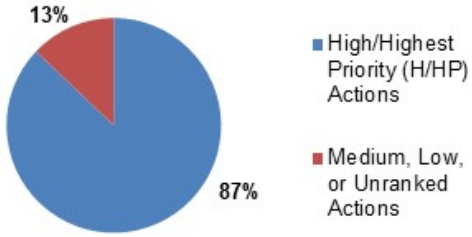


Figure 63. High Priority Plan Actions Implemented in Recovery Benefit Areas

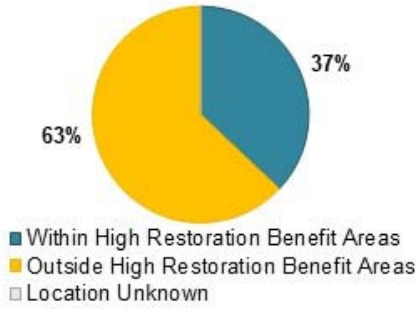
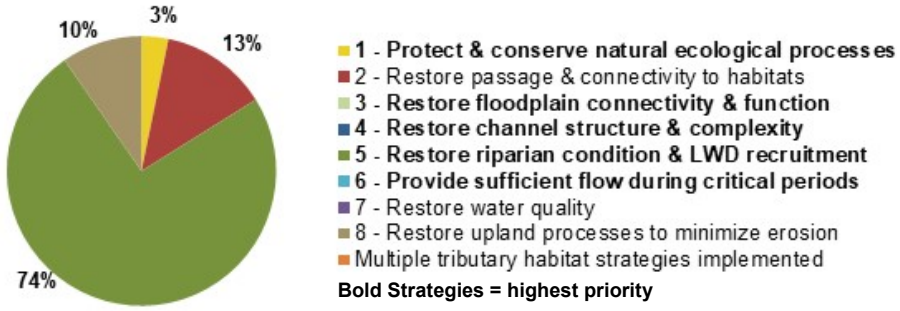


Figure 64. Recovery Plan Strategies Implemented: 2010—2016



Tributary Actions to Reduce Out-of-Basin Hatchery Origin Strays Spawning Naturally: 2010—2016

The plan recommends two actions, one harvest and one hatchery, to address threats to John Day River summer steelhead from out-of-basin hatchery origin strays[1]:
Harvest Action - Develop an education program to promote the use of selective recreational fisheries and retention of all hatchery fish caught to reduce the number of out-of-basin hatchery strays; **Hatchery Action** - Increase efforts to monitor the incidence of hatchery fish on spawning grounds through additional stream surveys and other methods.

Current Status = Partially Implemented. Since 2009, the proportion of out-of-basin hatchery strays has remained below 5% and correlates with reduced barge transportation (<30%) of Snake River hatchery steelhead smolts[32]. Juvenile steelhead monitoring includes age at seaward migration and juvenile migration timing; adult monitoring includes migration timing and age composition at return. Creel surveys at the MPG-scale were initiated in 2013. Due to limited funding, there is no adult monitoring of out-of-basin hatchery influences at the population scale. Full funding of RM&E Objective 5 is needed to expand study design to enhance monitoring efforts of hatchery influence on South Fork John Day steelhead viability (Objective 5, **Appendix A, Table A-7**).

Upper Mainstem John Day River Summer Steelhead Population

Population Status & Trends

- 2016 Status: **Maintained** (moderate, 6-25%, extinction risk)[3]; wild population
- The recent 10-year geomean natural origin abundance estimate of **884** (range 415—1,490, Spawning Years 2007—2016) is **below** the minimum abundance threshold of 1,000 spawners for low risk extinction (Figure 65)[1,6].
- During 2012-2016, hatchery strays accounted for an average of **1%** of total natural spawners (range 1% - 2%) which is **below** the HSRG's low risk hatchery-origin spawner threshold of 5% for a primary population (Figure 66)[4,6].
- The recent 20-year geomean recruits per spawner estimate is **1.05** (range 0.17—5.13, Brood Years 1991—2010); **slightly above** population replacement (R/S=1) **and below** the minimum threshold for recovery (R/S =1.35; Figure 67)[1,5,6].
- **New Information**: Approximately 53% of PIT-tagged John Day wild steelhead adults migrating through the FCRPS swam past the John Day River and were detected above McNary Dam; less than 50% of these steelhead successfully migrated back downstream to the John Day River to spawn[32-34] (see pages 39-40 for more information). Recent pHOS declines are correlated to reductions of barge transported Snake River steelhead smolts[32]. Monitoring evidence indicates that juvenile summer steelhead rearing habitat is limited throughout the John Day Basin due to high stream temperatures and low instream flow conditions[32].

Revised Primary Threats & Factors Limiting Population Viability[1]

Hydrosystem: Mainstem Columbia River passage and facility operations; *tributary overshoot (adult returns)

Tributary Habitat: Degraded channel structure/complexity (habitat quantity/diversity), degraded riparian areas and LWD recruitment, altered sediment routing, degraded water quality (water temperatures), altered hydrology, and degraded floodplain connectivity and function. Impaired fish passage is also a priority limiting factor in Beech and Laycock Creeks.

Hatchery: Effects of naturally spawning stray hatchery fish on viability of wild fish

Figure 65. Natural Spawning Abundance

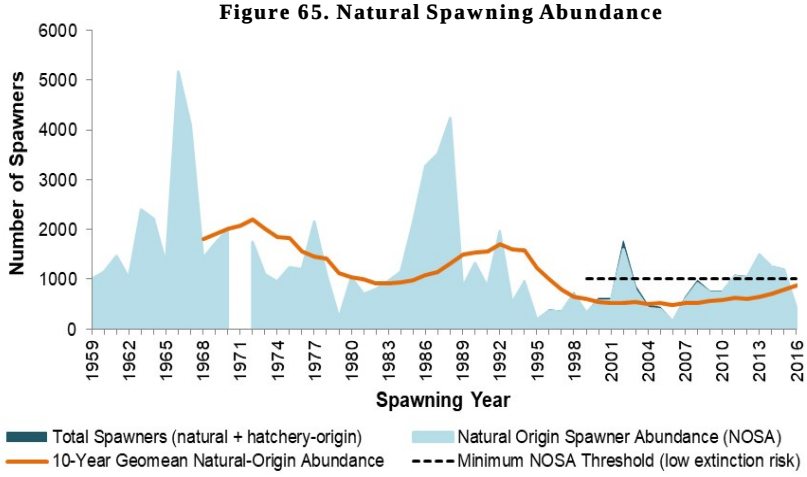


Figure 66. Hatchery Proportion of Natural Spawners

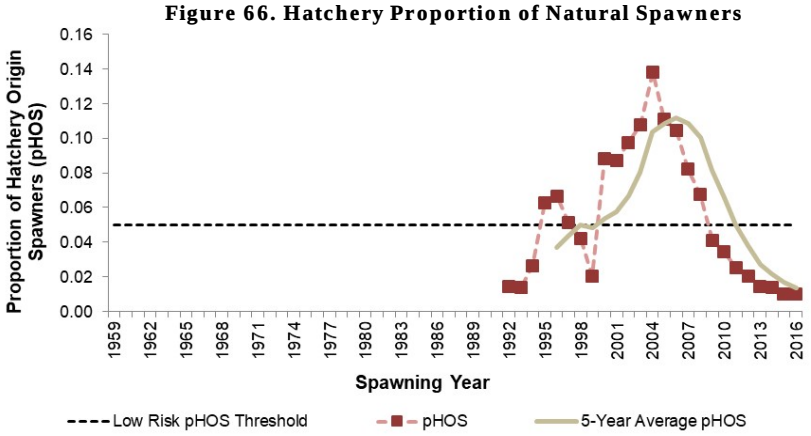


Figure 67. Adult Recruits per Spawner

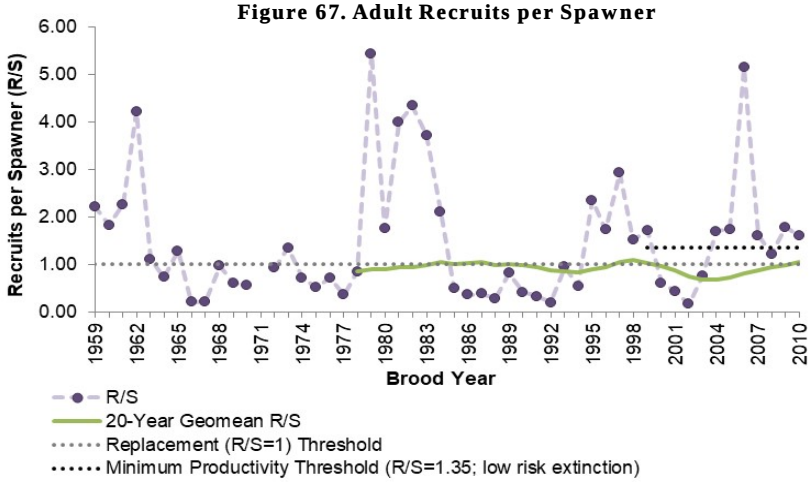
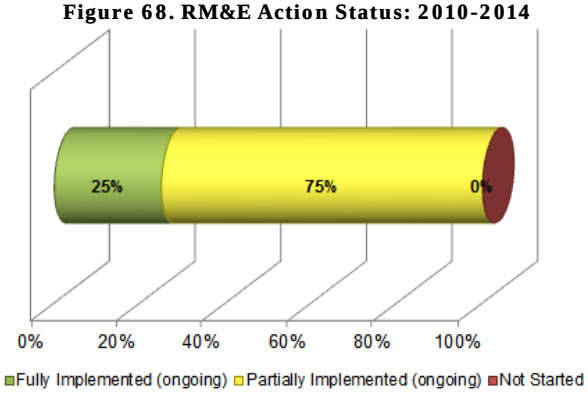


Figure 68. RM&E Action Status: 2010-2014



Research, Monitoring, & Evaluation (RM&E): 2010-2016

- The plan specifies **eight** RM&E recovery actions for the Upper Mainstem John Day steelhead population[1]. **25%** (n=2) were fully funded and implemented as of December 2016; **75%** (n=6) were partially implemented and **0%** not started (Figure 68).
- **Seven** RM&E actions are ranked high/highest priority in the plan; only **two** are fully implemented.
- Critical **monitoring gaps**:
  - CHaMP monitoring occurred during 2011-2012. As of 2013, there is no monitoring at the population scale. Funding is needed to fully implement the high/highest priority population viability, out of basin hatchery strays, habitat status/trend, and effectiveness monitoring objectives (Objectives 1-3, 5, & 8, Appendix A, Table A-8).
- See **Appendix A, Table A-8** for detailed RM&E action status information.

Tributary Habitat Protection & Restoration Actions: 2010—2016

- **339** tributary habitat strategic recovery actions are identified in the plan for the Upper Mainstem John Day steelhead population[1]. **42** actions (**12%**) were implemented through multiple projects during January 2010—December 2016.
- **~180** partners, including private landowners, completed an estimated **186** habitat projects in the population area. **60%** (n=112) of the projects had a nexus to one or more recovery plan actions (Figure 69); **88%** (n=99) of the plan-nexus projects implemented high/highest priority recovery actions (Figure 70) and of these, **25%** (n=25) occurred in high protection and/or restoration benefit areas (Figure 71).
- Predominant recovery plan strategies implemented: **Strategy 2** - restoring passage and connectivity to habitats; **Strategy 5** - restoring riparian condition and LWD recruitment; **Multiple Strategies** (combinations of strategies 3-8); and **Strategy 6** - providing sufficient flow during critical periods (Figure 72). This is consistent with the plan's highest priority tributary habitat recovery strategies (1, 2, 4, 5, and 6) for the population[1].
- **Implementation highlights**:
  - 47 barriers were removed or replaced and 76 fish screens were installed on diversions (Strategy 2).
  - Approximately 1,291 riparian acres and 114 riparian land miles treated/protected through the adoption of conservation easements, riparian exclusion fencing, vegetation planting/reseeding, and/or treatment of invasive plant species (Strategies 1 & 5).
  - 10 irrigation systems were improved for efficiency, three (3) of which installed return flow cooling systems. Instream leases protected an average of ~13.2 cfs within the basin during 2010-2016 (Strategies 6 & 7).
  - Habitat structures placed instream and restoration techniques applied to improve instream habitat-floodplain connectivity, complexity, and function in Lower Beech Creek and the Upper Mainstem John Day (Strategies 3 & 4).
- **Critical gaps**:
  - There is insufficient data at this time to adequately assess whether restoration projects completed thus far have improved steelhead habitat quantity and quality, and population viability. CHaMP monitoring was initiated in 2011. However, as of 2013 no monitoring occurs at the population scale due funding limitations. RM&E efforts need to be expanded and additional funding secured to better evaluate habitat condition, habitat restoration effectiveness, and relationships between fish and habitat use at the population/watershed scale (Objectives 3 and 8 in **Appendix A, Table A-8**).
- See **Appendix B, Table B-9** for a summary of completed habitat projects and associated treatment metrics.

Figure 69. Completed Habitat Projects

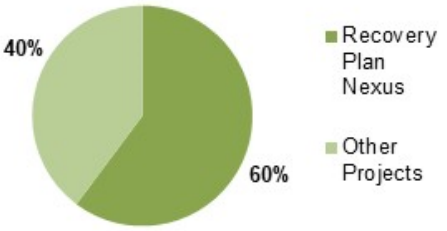


Figure 70. Recovery Plan Actions Addressed

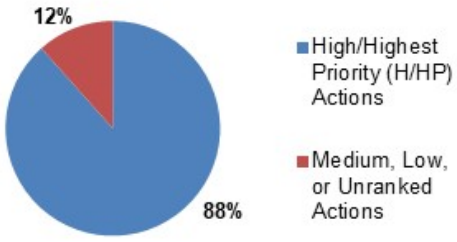


Figure 71. High Priority Plan Actions Implemented in Recovery Benefit Areas

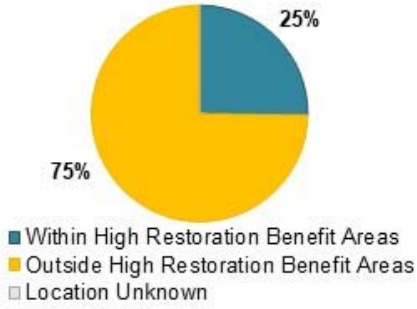
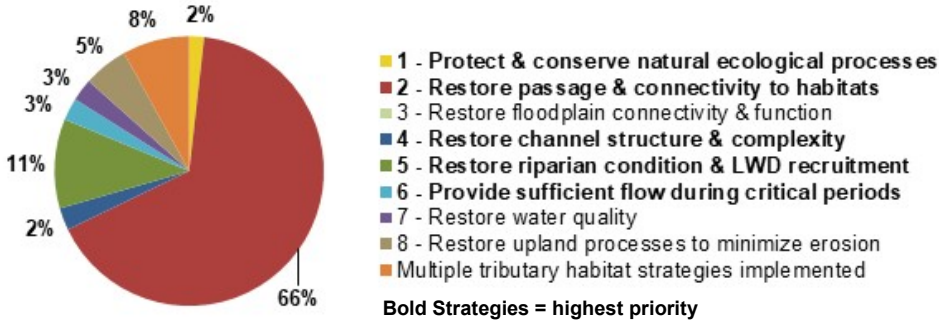


Figure 72. Recovery Plan Strategies Implemented: 2010—2016



Bold Strategies = highest priority

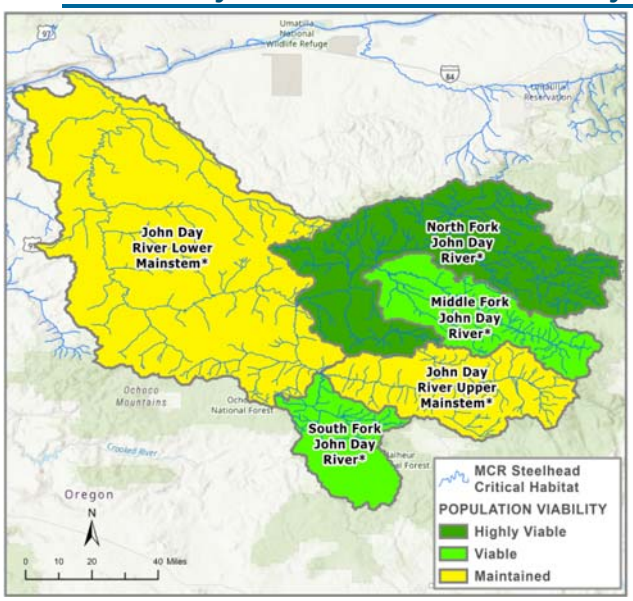
Tributary Actions to Reduce Out-of-Basin Hatchery Origin Strays Spawning Naturally: 2010—2016

The plan recommends two actions, one harvest and one hatchery, to address threats to John Day River summer steelhead from out-of-basin hatchery origin strays[1]:

Harvest Action - Develop an education program to promote the use of selective recreational fisheries and retention of all hatchery fish caught to reduce the number of out-of-basin hatchery strays; **Hatchery Action** - Increase efforts to monitor the incidence of hatchery fish on spawning grounds through additional stream surveys and other methods.

Current Status = Partially Implemented. Since 2009, the proportion of out-of-basin hatchery strays has remained below 5% and correlates with reduced barge transportation (<30%) of Snake River hatchery steelhead smolts[32]. Juvenile steelhead monitoring includes age at seaward migration and juvenile migration timing; adult monitoring includes migration timing and age composition at return. Creel surveys at the MPG-scale were initiated in 2013. Due to limited funding, there is no adult monitoring of out-of-basin hatchery influences at the population scale. Full funding of RM&E Objective 5 is needed to expand study design to enhance monitoring efforts of hatchery influence on Upper Mainstem John Day steelhead viability (Objective 5, **Appendix A, Table A-8**).

John Day River MPG: summary & recommendations



Viability Status

% of Viable Populations in the MPG[3]

60%

The John Day River Major Population Group is the only completely wild MPG in the Mid-C summer steelhead DPS. Currently, the North Fork John Day population is rated highly viable (very low extinction risk) and the Middle Fork and South Fork John Day populations are rated viable (low extinction risk)[3]. The Lower Mainstem and Upper Mainstem populations are rated maintained (moderate extinction risk)[3]. The Lower Mainstem John Day population, the only very large population in the MPG, will need to achieve viable status for the MPG to be rated viable (low extinction risk)[1-3]. Beyond ESA-delisting, Oregon's long-term goal is to achieve broad-sense recovery (very low extinction risk) for all five wild steelhead population areas[1].

Priority Recovery Gaps & Near-Term Recommendations

Highest priority, recovery gaps and recommended future actions for Oregon populations of Middle Columbia River Steelhead within the John Day River MPG include:

Tributary Overshoot (MPG-wide)

Tributary overshoot is a significant limiting factor, affecting ~53% of John Day River natural-origin steelhead adult returns annually[11,32,33,34]. Increased monitoring to evaluate overshoot causal mechanisms and viability impacts at the population scale, and implementing management practices to improve adult return upstream and downstream migration and survival through the FCRPS are highest priority actions. See pages 39-40 for more information on this emerging threat.

Viability and Threats Criteria Monitoring and Evaluation (MPG-wide)

As of 2016, increasing trends in natural-origin abundance and productivity, concurrent with good ocean conditions, have largely tracked well above population viability criteria and replacement thresholds for the majority of John Day River populations (e.g., North Fork, Middle Fork, and South Fork). Population monitoring and adult-smolt recruitment modeling indicates that outmigrant abundance remains high for the South Fork John Day population and the maximum sustained smolt production threshold is approximately 1,200 spawners[6,32].

For the Lower Mainstem John Day population, recent long-term natural-origin abundance and recruits/spawner estimates remain below viability criteria (2,250 N-O spawners and R/S $\geq$ 1.19, respectively). Additionally, Lower Mainstem 5-year average pHOS continues to track above the HRSG's recommended low risk threshold (5%). Although recent trends in pHOS (below 5% low risk threshold) and population replacement (values of R/S >1) are encouraging for the Upper Mainstem John Day River population, natural-origin abundance and productivity remains below the minimum viability thresholds (1,000 N-O spawners; R/S $\geq$ 1.35) for this population[5,6,32].

The majority of high-highest priority John Day steelhead recovery RM&E actions are only partially implemented to date due to funding limitations. Future monitoring funding is uncertain basinwide. Increasing RM&E capacity to characterize John Day steelhead population viability (abundance, productivity, spatial structure, and diversity), critical habitat availability, LFT status/trends, fish-LFT relationships, and recovery action implementation effectiveness is highest priority. These recommendations are consistent with the high-highest priority RM&E actions identified in the Recovery Plan. For additional information, see **Appendix A Tables A-4 through A-8**.

Minimize Hatchery Impacts on Wild Steelhead Viability (MPG-wide)

No hatchery programs exist within the John Day River MPG; it is the only entirely wild summer steelhead MPG in the Middle Columbia River steelhead distinct population segment (DPS). Therefore, protecting the viability and diversity of Oregon's John Day River wild summer steelhead populations by reducing the ecological effects of stray hatchery fish in the spawning areas is crucial to achieve MPG viability and DPS recovery. Adult steelhead monitoring indicates a correlation between recent declines in the proportion of hatchery-origin strays throughout the John Day River basin and reductions in the proportion (<30%) of barge transported Snake River hatchery steelhead smolts[32].

Highest priority actions to minimize hatchery influence on wild summer steelhead populations within the John Day include: (a) continue monitoring the incidence of hatchery fish on the spawning grounds; (b) continue barge transportation of Snake River hatchery steelhead smolts at proportions below 30%; and (c) implementing hatchery management practices that minimize the incidence of out-of-basin straying into the John Day MPG to "protect wild steelhead populations from detrimental interactions with hatchery fish" (OAR 635-500-0020(1)(c)).

Improving Habitat Quantity and Quality (MPG-wide)

Numerous restoration practitioners and private landowners within the John Day River MPG continue to address passage barriers and restore instream, riparian, and floodplain habitat conditions. The majority of tributary habitat recovery strategic actions, associated primary limiting factors, and prioritization rankings are identified at the watershed (10-digit HUC) or Major Spawning Area level in the Oregon Middle Columbia Steelhead Conservation and Recovery Plan. In 2010, ODEQ completed the John Day River Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) which identified many John Day basin rivers and tributaries are water quality limited during part or all of the year. Water quality impairments include high water temperatures, high bacteria levels, low dissolved oxygen concentrations, and degraded biological conditions (e.g., flow, stream morphology, riparian shading)[41].

Since 2008, Middle Fork Intensively Monitored Watershed (MFIMW) partners have monitored summer steelhead and spring Chinook salmon response to habitat restoration in the mid-upper portion of the subbasin. The first 10-year MFIMW Assessment Report provides a summary of results to date and future management-monitoring direction[40]. CTWRSO John Day Habitat Restoration Program staff have implemented irrigation efficiency monitoring to quantify losses from irrigation ditches in the Upper Mainstem John Day River sub-basin, establish a water budget, and evaluate the expected benefits of implementing ditch piping and agricultural water conservation measures at a specific site. John Day restoration practitioners (CTWSRO, Grant SWCD, Wheeler SWCD, Gilliam SWCD, ODFW) are also monitoring diversion projects in the basin to assess the effectiveness of various diversion replacement techniques (e.g., roughened riffle, lay-flat stanchion) in meeting both ecological restoration goals and landowner agricultural water use needs.

Several watershed surveys have been conducted since 2010 to quantify stream habitat conditions and limiting factors in high priority steelhead recovery areas, and strategically inform future restoration planning and project designs applied at the reach scale. Such assessments include the Mountain Creek Habitat Assessment (Lower Mainstem John Day River population)[35], Lower Cottonwood Creek Diversion Assessment (North Fork John Day River population)[36], Fox Creek Habitat Assessment (North Fork John Day River population)[37], and Middle Fork John Day Geomorphic (River Styles®) Assessment[38].

In 2014, the John Day Basin Partnership formed (with capacity support from OWEB's Focused Investment Partnership fund) to coordinate basinwide partners/resources to accelerate the pace and scale of habitat protection/restoration efforts to increase ESA-listed and Oregon priority native fish species viability (e.g., Middle Columbia steelhead, Columbia Basin bull trout, spring Chinook, redband trout, Pacific Lamprey), improve ridge-top to ridge-top watershed health, and promote thriving socio-economic communities[42]. The Cottonwood Creek Action Plan for Stream Temperatures (CAST) workgroup (Monument SWCD, ODFW, TFT, CTSWRO, USFWS, OWEB) formed in 2015 and applied for OWEB funding in 2016 to evaluate the feasibility of using the FAST stream temperature and flow predictive model[12] in Cottonwood Creek (North Fork John Day). CAST model development and fish population surveys will start in 2018. In 2016, the Lower John Day Basin Working Group received an OWRD grant (grant # G-0601-LJD) to develop a place-based integrated water resources plan. Partners include: Gilliam County SWCD, Gilliam-East John Day Watershed Council, Mid John Day-Bridge Creek Watershed Council, CTWSRO, ONDA, NRCS, Sherman County Area Watershed Council, Sherman SWCD, Gilliam County Cattlemen, The Freshwater Trust, Water Watch of Oregon, OWRD, ODEQ, ODFW, and Wheeler SWCD. The group expects to have a completed water plan ready for implementation in 2019.

Fish-Habitat Monitoring Data

Steelhead life-cycle modeling and fish-habitat monitoring evidence indicates that juvenile summer steelhead rearing habitat is limited due to high stream temperatures and low instream flow conditions in the John Day River population areas[32,39,40]. Consequently, the highest priority for tributary habitat recovery within the John Day River MPG is measurably improving juvenile summer steelhead rearing habitat through land management practices that (1) protect and conserve high quality steelhead habitats, (2) reduce the occurrence of low instream flows and high water temperatures, and (3) increase channel-floodplain habitat connectivity, complexity, and function. Per the Oregon Mid-C Recov-

ery Plan and supported by recent research and monitoring results, the actions that are most likely to improve instream temperature, natural flow regimes, and extent of juvenile rearing habitat include, but are not limited to:

- Restoring floodplain connectivity and channel hydrology via beaver restoration and small wood installation, where appropriate[1,39,43];
- Protecting and increasing riparian vegetation development and shading[1,39,40,41,44-46];
- Improving forest stand and land management practices to enhance subsurface water storage and delivery[1,47]; and
- Improving short- and long-term instream habitat complexity by pairing extensive riparian planting with high density wood addition, where appropriate[1,39].

Targeting cold-water input sources for protection and restoration actions will optimize the ecological effectiveness of land management practices and habitat improvements[39,40]. Tributary habitat restoration actions that are linked to long-term monitoring programs will facilitate adaptive management and strategic action implementation to advance steelhead recovery and resilience to climate change[1,3,39,77]. For additional information, refer to the Oregon Mid-C Plan recovery action spreadsheets for each population[31].

Expected benefits to John Day River steelhead from implementing these recommendations:

- **Increase steelhead survival in the mainstem Columbia River FCRPS corridor and wild adult returns to natal spawning tributaries.**
- **Increase detection of viability criteria gaps including the threats/factors limiting population and MPG viability.**
- **Continue protection of wild summer steelhead genetic diversity.**
- **Increase tributary habitat capacity by improving streamflows and instream water temperatures to support steelhead rearing and migration, restoring channel-riparian-floodplain habitat connectivity, and addressing high priority screens and barriers to fish passage.**

John Day River wild summer steelhead. Photo: Ian Tattam (ODFW)