

# Recovery Outline



Figure 1: Dorsal view of a light form male. Photo credit: Dr. Ed Keppner.

**Species Name:** Panama City crayfish, *Procambarus econfinae*

**Lead Regional Office/Cooperating RO(s):** Southeast Region, Atlanta, GA

**Lead Office/Cooperating FO(s):** Florida Ecological Services Field Office

**Listing Status:** Threatened

**Critical Habitat Designation:** Yes. 4,138 acres (1,675 hectares) (87 FR 546 581)

**Recovery Priority Number:** 2 (this species has a high degree of threat with a high potential for recovery, designating a Recovery Priority Number of two)

**Species Range:** Bay County, Florida

**Final Listing Rule Date:** February 4, 2022 (87 FR 546)

**Type of Recovery Plan/Outline:** Single species

## SPECIES SUMMARY:

- **Brief Life History**

The life history of Panama City crayfish (PCC) is not well known. This species is found exclusively in Bay County, Florida where there are nine known populations. It is believed dispersal abilities are poor and are unlikely to exceed 0.25 mile (0.4 kilometer) (Duncan et al. 2017). Probable migration of PCC primarily occurs during flooding events. Vegetation in PCC habitat is likely an important resource for both shelter and food. In times of drought, PCC burrow through core soil structure to reach the water table. Core soils are the soils within Bay County that provide long hydropattern wetlands that are ideal substrate for burrow construction and support herbaceous vegetation needed for food and shelter (see table 2.3 in the SSA for a list of core and secondary soil types). General life history information for crayfish in North America were combined with some PCC specific information to generate the life history outlined below.

### General life history information for crayfish of North America (Butler et al. 2003):

- Mate in the spring.
- Fertilized eggs adhere to female's swimmerets and upon hatching remain with the female for the first three molts.
- Optimum temperature is thought to range from 68-79°F (20-26°C).
- Maximum lifespan of 1.5-3.5 years.

### PCC specific life history information:

- Males alternate between reproductively mature forms (Form I) and nonreproductive forms (Form II) through a series of molts (Taylor et al. 1996).
- Females shelter in burrows with eggs or young from March through September (Hobbs 1942, Keppner and Keppner 2002, Florida Fish and Wildlife Conservation Commission [FWC] 2017 dataset).

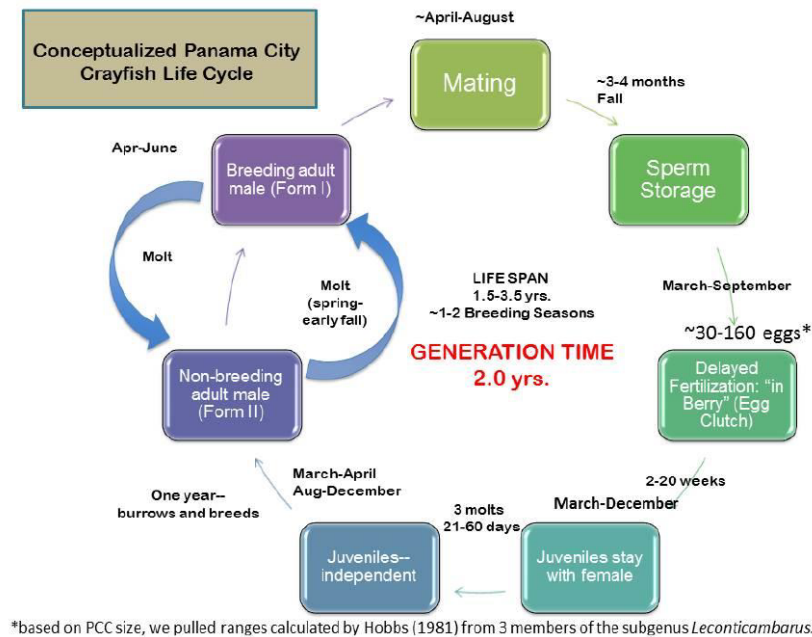


Figure 2: Conceptualized PCC Crayfish Life Cycle integrated with similar crayfish *P. hayi* (Longshaw and Stebbing 2016).

- **Limiting Life History Characteristics:**

The PCC molts its exoskeleton to allow for growth. While the exoskeleton hardens, the crayfish is more vulnerable to predation and pollutants. Growth tends to occur during periods of maximum availability of food and optimum temperatures. Adult and juvenile PCC held in captivity have often died during molting phases when neither predation nor pollution was a factor. Further research needs to be conducted to determine the cause of mortality at this stage and if it occurs only in captive populations or if it also occurs in wild populations.

- **Primary threats:**

- Habitat loss and degradation due to human development and associated activities.
- Habitat alterations from forestry practices such as bedding and dense tree planting.
- Fire suppression within their range has reduced herbaceous vegetation.
- Genetic degradation due to inbreeding.
- Vulnerabilities associated with stochastic events including droughts, flooding, pollution, and alterations in groundwater quality and quantity.

- ***Habitat requirements:***

Historically PCC was found in natural temporary bodies of shallow fresh water located in pine flatwoods and prairie-marsh systems (Hobbs 1942). However, development has altered most of these communities. PCC is now often found in gently sloped grassy ditches and swales, slash pine plantations, and utility rights-of-way (Keppner and Keppner 2001).

Requirements:

- Shallow fresh water
  - Herbaceous vegetation
  - Little to no shrub or tree cover
  - Connected core and secondary soil types of sufficient sizes
  - Water table less than 3 feet from surface
- ***3Rs:***
    - Resiliency: There is not enough information to fully understand the PCC's resiliency requirements. The number of populations that exist within the nine remaining occupied habitats is unknown. The relative population sizes, rates of growth, or population trends are also unknown.
    - Representation: There is low genetic diversity and high rates of inbreeding throughout the PCC populations. Because of these factors, it is estimated that PCC have low adaptive potential.
    - Redundancy: PCC are endemic to a very small geographical region. Therefore, naturally their redundancy is very low. Historical and continuing development trends in their range have further reduced redundancy for this species.

To obtain detailed information regarding this species, including Federal Register documents, the Species Status Assessment, final listing rule, and other informational documents, please visit <https://ecos.fws.gov/ecp/species/8915>.

**ON-GOING CONSERVATION ACTIONS:**

- *Research/data gaps:* The U.S. Fish and Wildlife Service (Service) and FWC funded the development of a translocation plan with species expert, Dr. Jim Austin, University of Florida. The plan will provide information and guidance on necessary translocations of PCC between populations to improve genetic stability.
- *Surveys and Monitoring:* The Service is working with FWC and a local environmental contractor to evaluate the best way to structure a monitoring and sampling effort that will be effective in identifying species stability through population trends. Data gaps that should be addressed through a standardized sampling and monitoring protocol include population size, demographics, rates of growth, sub-populations, trends, minimum viable population size, and habitat area.
- *Habitat:* Since 2011, identification and restoration of parcels of degraded PCC habitat have been conducted. Efforts include identifying conservation easements and establishing landowner agreements, as well as monitoring and maintaining PCC habitat within its range. The Service has identified that 2,200 acres of habitat, under appropriate permanent or long term management, is sufficient for conservation of the PCC (USFWS, 2019). Currently just over 200 acres are protected. Additional acreage is in the process of being

purchased through Florida Department of Environmental Protection's land acquisition program using State of Florida budgetary funds.

- *Outreach/Education*: Outreach and education efforts thus far have been opportunistic with no strategic planning in place.
- *Regulatory*: The Florida Department of Transportation (FDOT) has requested incidental take for all lands within their right-of-way and areas for stormwater construction. In exchange, FDOT will provide \$3.5 million to an endowment fund to be organized by the Service. The interest from the fund will support management and habitat acquisition efforts for PCC.

### **INTERIM RECOVERY STRATEGY:**

The primary threats to PCC include further habitat loss, degradation, and fragmentation leading to an increase in isolated populations. Recovery efforts should focus on increasing permanent protection and management of habitat, restoring habitat, and implementing the translocation plan once completed to reduce inbreeding. If these efforts are conducted, resiliency and representation for this species will increase, furthering recovery of the species.

Interim recovery actions necessary to prevent further declines in the species status include:

- ❖ Protect land from development in known PCC range.
- ❖ Restore and maintain known habitat.
- ❖ Initiate research to address critical information needs (population dynamics, life history, ideal habitat).

### **ACTION PLAN:**

The main threats to this species are habitat loss due to development and forestry practices, fire suppression, genetic homogeneity, and stochastic events. To address these threats, initial action plans are outlined below.

#### ***Research/data gaps:***

Overarching goal: Fill data gaps that are necessary to understand the survival and recovery of PCC.

- Support research on population dynamics, life history, and responses to habitat improvements to gain a better understanding of what a stabilized population looks like and depends upon.
- Determine population trends and obtain a better understanding of the ideal habitat conditions for the species.
- Implement the translocation research plan established by the University of Florida.

#### ***Surveys and Monitoring:***

Overarching goal: Understand species trends and answer research questions.

- Utilize the strategic monitoring program that was established by a local environmental contractor to create a long-term survey and monitoring plan that will help answer the research and data gaps mentioned above.

#### ***Habitat:***

Overarching goal: Protect and manage 2,200 acres of habitat that contain large sections of core and secondary soils.

- Work with the following stakeholders to protect and acquire suitable habitat for the PCC through conservation agreements, easements, management agreements, or land acquisition:
  - St. Joe Timber Company
  - Florida Power and Light
  - Bay County
  - Agri Reserves
  - Other private landowners
- Work with FWC and other partners to establish a site specific, regular maintenance strategy for protected PCC habitats.

#### ***Outreach/Education:***

Overarching goal: Increase public awareness about the PCC and its requirements. Clearly communicate current condition, relevancy, regulations, and outlook.

- Establish an outreach strategy that includes signage of areas where bait collection and PCC habitat coincide.
- Establish integration of informative kiosks along boardwalks within established easements open to the public.
- Emphasis synergistic approach of PCC conservation merged with passive recreational uses such as hiking, biking, and nature explorations.

#### ***Regulatory:***

Overarching goal: Provide direction to local government and stakeholders on how to regulate PCC habitat.

- Write a Recovery Plan that complements and implements FWC's Draft Management Plan, Species Conservation Measures, and Permitting Guidelines.
- Provide updated comprehensive maps (via GIS Shapefiles) of known PCC suitable habitat to Bay County planning office and Panama City planning department on annual basis.
- Provide maps (via GIS Shapefiles) of Conservation Easement areas to FDOT as new ones are protected so they can avoid placement of stormwater structures and contractor staging areas.
- Continue working with developers and local/county office on integration of Conservation Measures within proposed projects that may impact PCC and their habitat. Measures include avoidance of critical habitat to the extent possible and steering impacts away from primary soil types when possible.

#### **STAKEHOLDER INVOLVEMENT:**

During the recovery planning process, we will seek input, comments, and review from multiple stakeholders within Bay County. These will include State and Federal agencies, industrial and agricultural groups, forestry groups, research universities, conservation organizations, and species experts.

#### **RECOVERY PLANNING MILESTONES:**

Service policy states that a draft recovery plan will be completed within 18 months with a final plan available within 2 ½ years of listing. Identification of interim milestones may ensure expeditious process to meet those timeframes.

#### Milestones

- Listing date: February 4<sup>th</sup>, 2022
- Recovery Outline due date: September 5<sup>th</sup>, 2022
- Draft Recovery Plan due date: August 4<sup>th</sup>, 2023
- Final Recovery Plan due date: August 4<sup>th</sup>, 2024
- First 5-year review due date: February 4<sup>th</sup>, 2027

Signed: \_\_\_\_\_ Date: \_\_\_\_\_  
 Division Manager, DR, South Atlantic-Gulf Region

**Suggested Citation:**

U.S. Fish and Wildlife Service. 2022. Recovery outline for the Panama City crayfish. Florida Ecological Services Field Office, Panama City, Florida.

**References**

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