

# History

- Listed 1967
- Critical Habitat designated in 1994
  - 7 reaches totaling 379 miles
- Recovery plan in 1990
- Recovery goals in 2002: Defined recovery
  - U.S. District court ruling in 2006 “lacked time and cost estimates”
- Draft 2009 revision: never finalized
- 2011 5-Year Review

# Distribution

- 6 populations
- 5 upper Colorado River Basin
- 1 in lower basin
- Grand Canyon
  - LCR
  - 8 mainstem aggregations





# Recovery

- Two recovery units: Upper Basin/Lower Basin
- Different recovery/conservation programs
- Covered by 3 programs
- Recovery in both units necessary
- Two types of criteria for downlisting/delisting
  - Demographic (3)
  - Recovery factors (minimize or remove threats)

# Recovery

- Service policy (U.S. Fish and Wildlife Service 1990b) describes recovery as “...*the process by which the decline of an endangered or threatened species is arrested or reversed, and threats to its survival are neutralized, so that its **long-term survival** in nature can be ensured. The goal of this process is the maintenance of secure, self-sustaining wild populations of species with the **minimum necessary investment of resources.**”*
- The ESA’s implementing regulations (50 CFR § 402.02) define recovery as “...*improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act.*”
- Section 4(b) of the ESA suggests that a species may be delisted on the basis of recovery only if the **best scientific and commercial data available** indicate that it is no longer threatened or endangered.

# Downlisting

- (1) the trend in adult (age 4+;  $\geq 200$  mm TL) point estimates for each of the six extant populations does not decline significantly; and
- (2) mean estimated recruitment of age-3 (150–199 mm TL) naturally produced fish equals or exceeds mean annual adult mortality for each of the six extant populations; and
- (3) two genetically and demographically viable, self-sustaining core populations are maintained, such that each point estimate for each core population exceeds 2,100 adults; and
- (4) when site-specific management tasks to minimize or remove threats have been identified, developed, and implemented.

# Delisting

- (1) the trend in adult point estimates for each of the six extant populations does not decline significantly; and
- (2) mean estimated recruitment of age-3 naturally produced fish equals or exceeds mean annual adult mortality for each of the six extant populations; and
- (3) three genetically and demographically viable, self-sustaining core populations are maintained, such that each point estimate for each core population exceeds 2,100 adults; and
- (4) when certain site-specific management tasks to minimize or remove threats have been finalized and implemented, and necessary levels of protection are attained.



# Site specific Management Actions

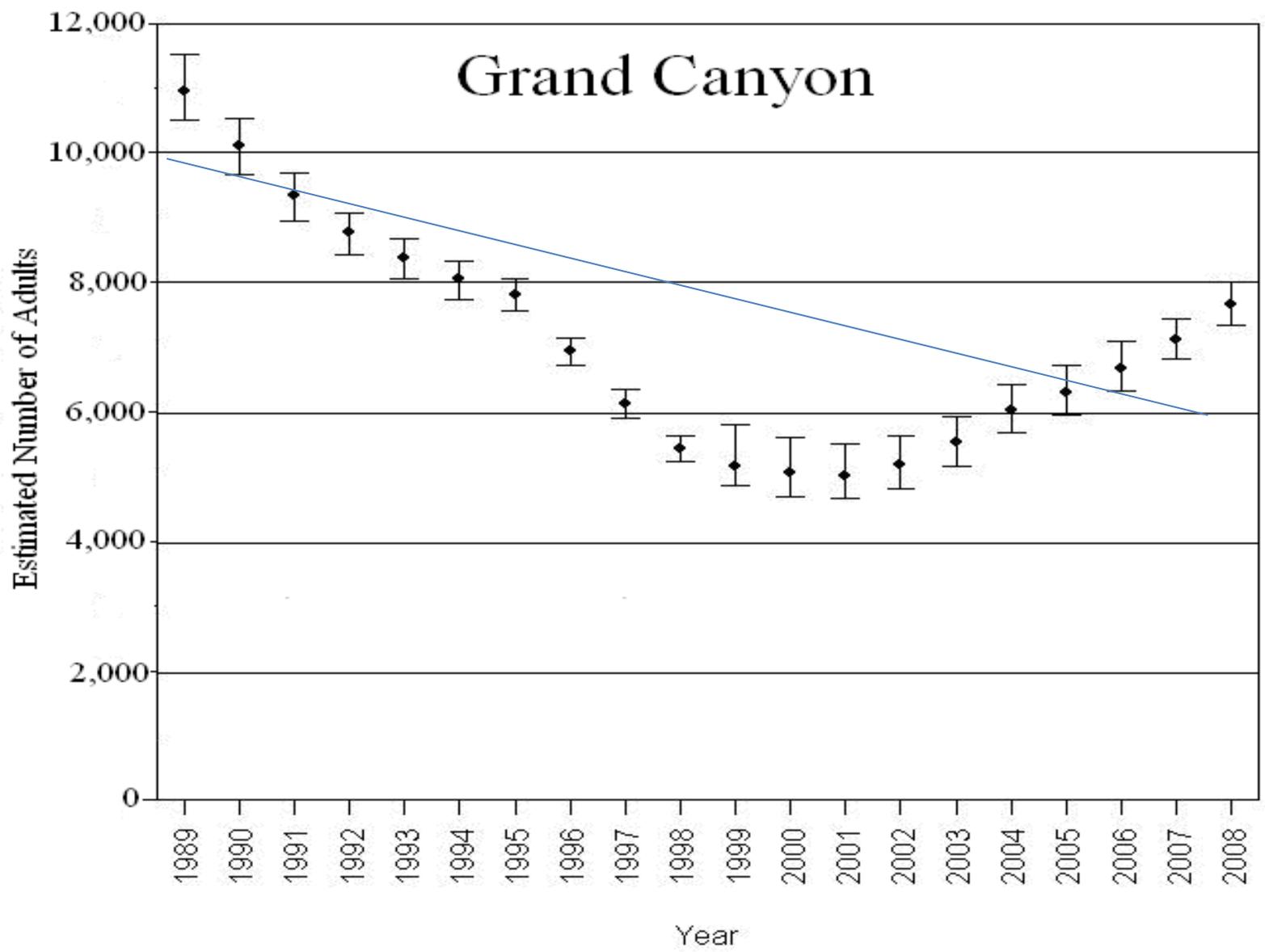
- Adequate habitat and range for recovered populations
- Protection from overutilization
- Protection from diseases and predation
- Adequate regulatory mechanisms
- Other natural or manmade factors for which protection has been provided



## Criteria 1a: Core population maintained over a 5 year period, adult trend does not decline

- Review: Partially met
- Justification:
  - Distribution in Grand Canyon
  - Analysis isn't limited to most recent 5 years
  - Downward trend in ASMR
  - Uncertainty about aggregations
- How to get to “fully met”
  - Continued upward and positive trend in ASMR
  - See appreciable increases/expansion of aggregations

# Grand Canyon



# Criteria 1a: Core population maintained over a 5 year period, adult trend does not decline

- Review: Partially met
- Justification:
  - Distribution in Grand Canyon
  - Analysis isn't limited to most recent 5 years
  - Downward trend in ASMR
  - Uncertainty about aggregations
- How to get to “fully met”
  - Continued upward and positive trend in recent ASMR
  - See appreciable increases/expansion of aggregations



## Criteria 1b: Core population maintained over a 5 year period, mean recruitment of age 3 fish equals or exceeds mean adult mortality

- Review: Partially met
- Justification:
  - Ageing error with ASMR
- How to get to “fully met”
  - Continued upward trend in recent ASMR estimates
  - See appreciable increases/expansion of aggregations
  - Resolve ageing errors



Criteria 1c: Grand Canyon population is maintained over a 5 year period that each population exceeds 2,100 adults

- Review: Met!
- Justification:
  - Estimate of adults is above 2,100 per ASMR
  - Accept estimates as far back as they have been calculated
- Future goal revision to include updated MVP number per Dexter project

## Recovery Factor A: Adequate habitat and range

Criterion 1: life stages and habitats of HBC in the mainstem identified and the relationship between the LCR/mainstem determined

- Review: Met!
- Justification:
  - Site fidelity
  - Monitoring information

Recovery Factor A: Adequate habitat and range  
Criterion 2: Continue GCD operations to benefit spawning,  
nursery, juv/adult habitat

- Review: Partially met
- Justification:
  - Used 2008 BO
  - Mainstem habitat and flow relationships still unclear
  - Outcome of key conservation measures unclear
- How to get to “fully met”
  - Implement the conservation measures/RPM’s in 2011 BO
  - Development of flow options for nonnative fish control
  - Progress on demographic criteria

Recovery Factor A: Adequate habitat and range  
Criterion 3: Effects and feasibility of a Temperature control  
device

- Review: Met!
- Justification:
  - Risk assessment (2004)

## Recovery Factor B: Protection from overutilization

### Criterion 4: Commercial, recreational, scientific or education

- Review: Met!
- Justification:
  - No commercial harvest
  - CRMP
  - Grand Canyon Handling Protocol

Recovery Factor C: Protection from diseases/predation  
Criterion 5: Asian Fish tapeworm

- Review: Met!
- Justification:
  - Methods for controlling tapeworm are known
  - Cold mainstem temps interrupt life cycle
  - No evidence that disease impacts lifecycle

Recovery Factor C: Protection from diseases/predation  
Criterion 6: Procedures developed to minimize escapement of  
nonnative fish species into the Colorado river/tribs

- Review: Not been Met
- Justification:
  - No procedures developed
  - Poor understanding of where problematic fish occur
  - Unlikely to detect new nonnatives if they did occur
- How to get to fully met:
  - Identify sources of nonnative fish
  - Plans in place to minimize watershed level introductions
  - Better monitoring to detect rare/new species

Recovery Factor C: Protection from diseases/predation  
Criterion 7/8: Nonnative control programs should be  
developed/implemented

- Review: Partially met
- Justification:
  - Nonnative fish in the LCR appear low..sampling doesn't target these species
  - Levels of control necessary to maintain low trout are unknown
  - Effects of mechanical removal unclear
- How to get to fully met:
  - Response program developed to address nonnative fish
  - Identify levels necessary to maintain low predation
  - Develop a nonnative control program

Recovery Factor D: Adequate regulatory mechanisms  
Criterion 9: Legal protection of habitat

- Review: Met!
- Justification:
  - Grand Canyon Protection Act
  - Grand Canyon National Park
  - LCR watershed plan
  - Development of Navajo Watershed Plan for LCR

Recovery Factor D: Adequate regulatory mechanisms  
Criterion 10: Conservation plans identified to provide for long-term management and protection of HBC populations

- Review: Not been met
- Justification:
  - Conservation plans have not been developed
- How to get to fully met:
  - Develop conservation plans that cover HBC and their habitats beyond down/delisting

## Recovery Factor E: Natural or manmade factors

### Criterion 11/12: Hazardous materials spill response plans and measures identified to minimize

- Review: Not been met
- Justification:
  - Hazardous material spill plans have not been developed
  - No measures identified to minimize risk on Hwy 89
- How to get to fully met:
  - Emergency response plans for spills and other watershed level catastrophes

<b>CRITERIA FOR DOWNLISTING</b>	<b>HAS BEEN MET</b>	<b>HAS BEEN PARTIALLY MET</b>	<b>HAS NOT BEEN MET</b>
<b>Demographic</b>			
Upper Colorado River Subbasin			1a, 1b, 2
Lower Colorado River Subbasin	1c	1a, 1b	
<b>Upper Basin Recovery Factors</b>			
Recovery Factor A		1	
Recovery Factor B	2		
Recovery Factor C	4	5	3
Recovery Factor D		6	7
Recovery Factor E		10	8, 9
<b>Lower Basin Recovery Factors</b>			
Recovery Factor A	1, 3	2	
Recovery Factor B	4		
Recovery Factor C	5	7, 8	6
Recovery Factor D	9		10
Recovery Factor E			11, 12

# Factor A: Flows

- Appear to be met given status/trend of HBC
- Need to relate flow to habitat conditions
- LCR watershed planning (1995 BO)
- Changes in LCR hydrograph difficult to detect

# Factor B: Overutilization

- Some HBC are killed via field work activities, regulated under Section 10a 1a permits
- Overall increase in population

# Factor C: Predation/Competition

- Nonnative fishes are low in abundance in LCR
- No target level identified in recovery goals
- Nonnative fish stocking has been evaluated
- Asian fish tapeworm, effects unknown

# Factor D: Existing Regulatory Mechanisms

- Appear to be met in the LCR
- Still need model that defines instream flow needs

# Factor E: Natural and man-made factors

- Minimize the risk of hazardous chemical spill
- Part of HBC comprehensive plan