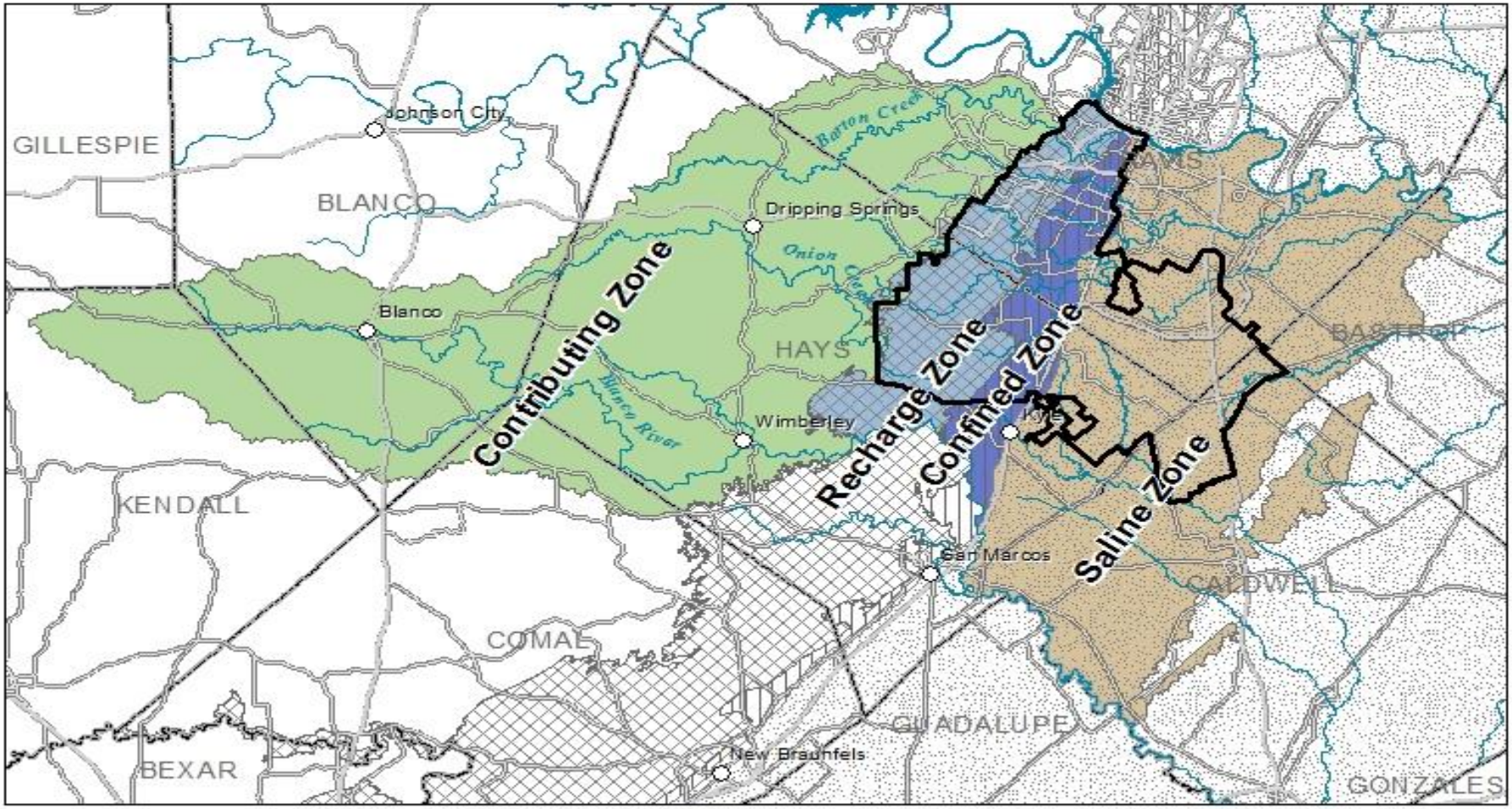
Review Draft HCP

AKA "Light at the End of a Very Long Tunnel"



Basemap: Contributing Zone compiled from Onion Creek, Barton Creek, and Blanco River watersheds;
Recharge Zone extracted from TCEQ Edwards Aquifer Administrative Boundary dataset;
Confined Zone modified from TWDB Major Aquifers, Edwards Aquifer subcrop dataset;
Saline Zone extended from Edwards Aquifer subcrop eastern boundary.
Robin Gary, BSEACD, October 2013.

"HCP 101" Take-away:

- Approved HCP supports the ITP
  - ITP provides an ESA exemption and legal cover for both
    - the District and
    - its permittees
  - District-authorized Edwards withdrawals produce "take" of endangered species
- Without an ITP/HCP, such take is likely not legally allowable under federal law
  - Could subject both the District and its permittees to FWS enforcement actions
  - Could subject both the District and its permittees to citizen suits under ESA.

Part 3 Tonight

- Update on HCP status/changes
- Reviewing more prescriptive Chapters 5-11:
  - Take estimates, effects, and impacts
  - HCP-specific conservation measures
  - Other HCP-specific commitments
  - Funding
- Conditionally approving your consensus changes for inclusion in Public Draft HCP

Update on HCP Status/Changes

- FWS Scoping Meeting will now probably be April 3 (to be further discussed tonight)
- FWS : exempt well use can't be a Covered Activity for us, as we don't issue permits for them
- Requires following changes:
  - Narrative descriptions of Covered Activities and accounting for exempt use
  - Take estimation spreadsheet-modeled effects of Covered Activities and on reference/baseline quantities

Update on HCP Status/Changes (cont'd)

- Recent FWS comments will require some changes from your binder version
- Should not affect the overall conclusions or basis of the plan
- Will change the categorization of some measures and commitments
- Will require some additional discussion of mitigation measures tonight
- All changes will be available to Board in markup before next Board meeting on March 13

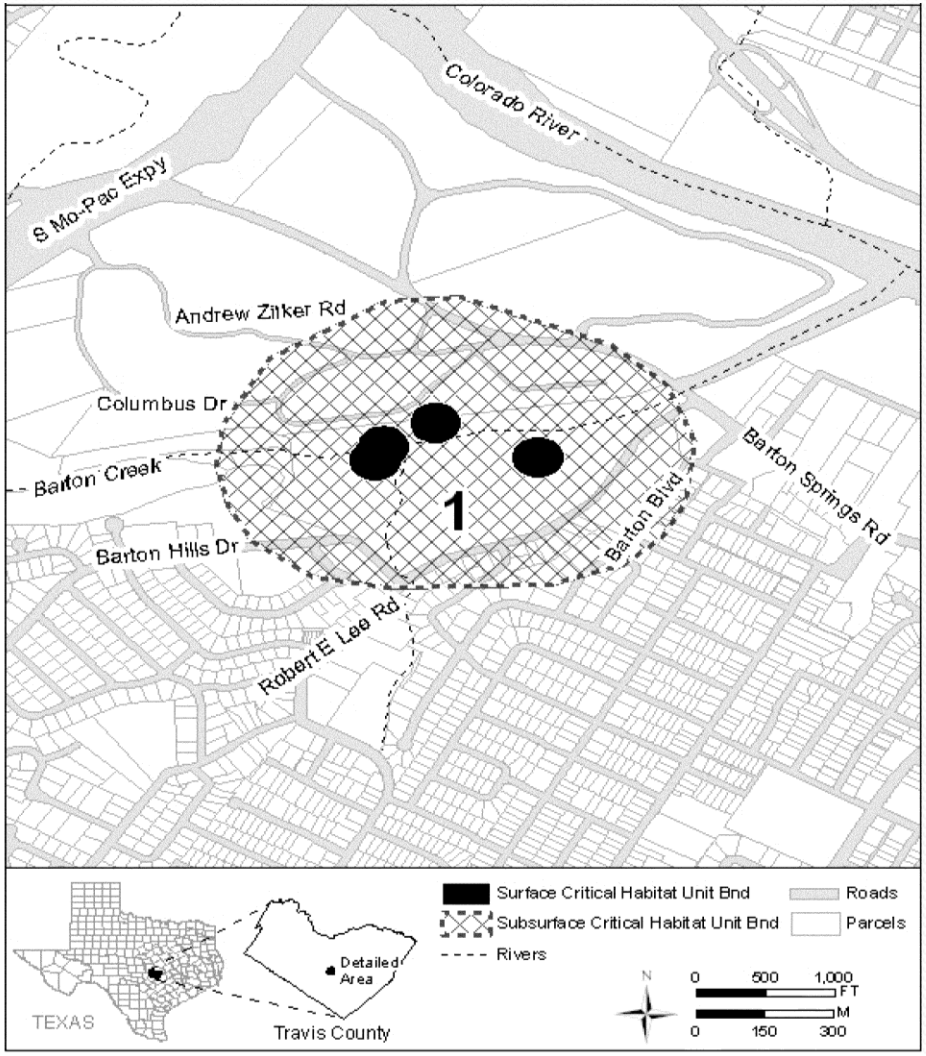
Reviewing HCP Chapters 5-10

- In work session, again proceed chapter by chapter:
  - Present summary highlights and comments
  - Moving fast through lots of complicated material, so please request clarification of content or note obvious errors;
  - Board will then discuss that chapter, as needed to understand, amplify, comment on and/or modify content; and
  - Flag consensus changes
- In open session, Board will approve flagged changes to be made for the MAC Review Draft HCP.

Chapter 5: Analysis of Likely Impacts of the Taking

- Describes two salamanders as Covered Species
- Describes their distribution in aquatic habitats
  - BSS: more surface habitat
  - ABS: more subterranean habitat
- Species have similar threats; most beyond District control
- Stressors affected by HCP Covered Activities:
  - Reduced springflow at outlets during severe drought
  - Decreased DO in springflow during severe drought
  - Somewhat higher TDS concentrations (salinity)

Critical Habitat for Austin Blind Salamander



Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Survival needs of Covered Species:
  - Supply of high-quality fresh water with narrow range of physicochemical conditions
  - Sufficient DO concentration and water velocity for respiration
  - TDS concentrations that support egg and larval forms of these adapted species
  - Interconnected submerged surface and subsurface habitats
  - Extreme drought characteristics that don't exceed resiliency of these small populations

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Take caused by physical and biological changes in individuals
  - Effects similar but not identical between species
  - Effects are outlet-specific
  - Covered Activities cannot differentially target effects at individual outlets or on species
  - Take is overprinted on "natural" adverse effects
- Take is springflow dependent, begins at
  - Upper Barton Spring at 40 cfs (habitat stops flowing)
  - Eliza Spring at 21.2 cfs (physiological response to DO)

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Estimated Population Base:

For Barton Springs salamander:		For Austin blind salamander:	
Main Spring:	447	Main Spring:	91
Eliza Spring:	1234	Eliza Spring:	420
Old Mill Spring:	97	Old Mill Spring:	489
Upper Barton Spring:	100		

Perennials: Take starts at 21.2 cfs of springflow

Intermittent: 100 organisms 49% of time (40 cfs)

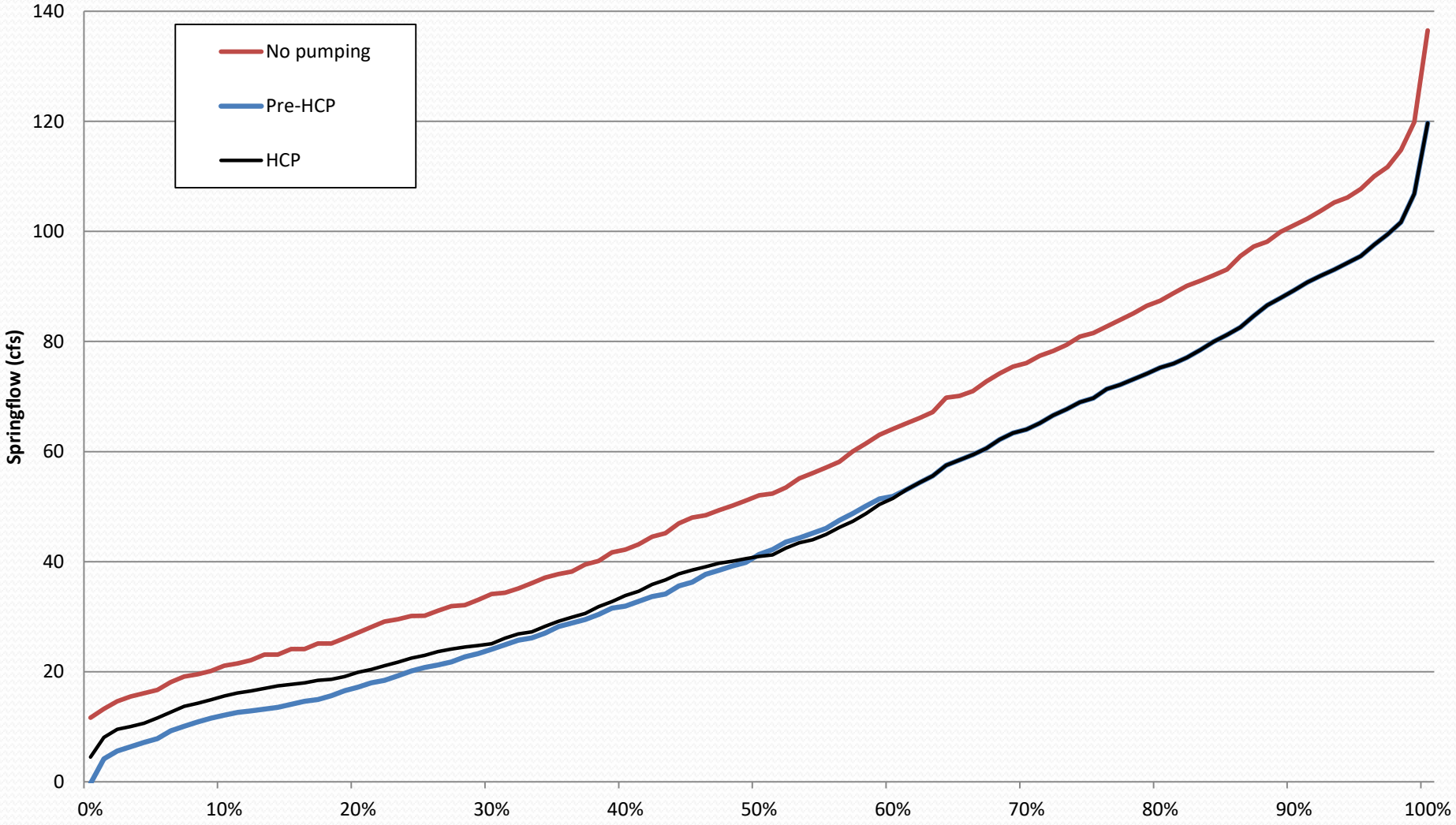
Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Lethal take estimate approach:
  - Lab study at UT to evaluate DO and lethality
  - Probabilistic Ecological Hazard Assessment (PEHA) at UT to relate DO, adverse effects, and springflow
  - Step-wise spreadsheet model by staff to extend PEHA:
    - 3 pumping scenarios (No Pumping, 2004 Pre-HCP , 2014 HCP)
    - Non-exempt authorized pumpage (11.6 cfs annually), adjusted for monthly UDCP amounts ~~plus 5% for exempt use~~
    - ½ population at calculated outlet DO, ½ migrate to 1 mg/L higher (surface for BSS; subterranean unconfined for ABS)
    - Estimated DO effect on natality
    - Shifted ABS mortality curve slightly to account for adaptation to lower DO habitat observation/inference

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Steps in spreadsheet modeling:
  - Develop and analyzing total springflow hydrographs for pumping scenarios

Barton Spring Flow Percentiles with Pumping Scenarios



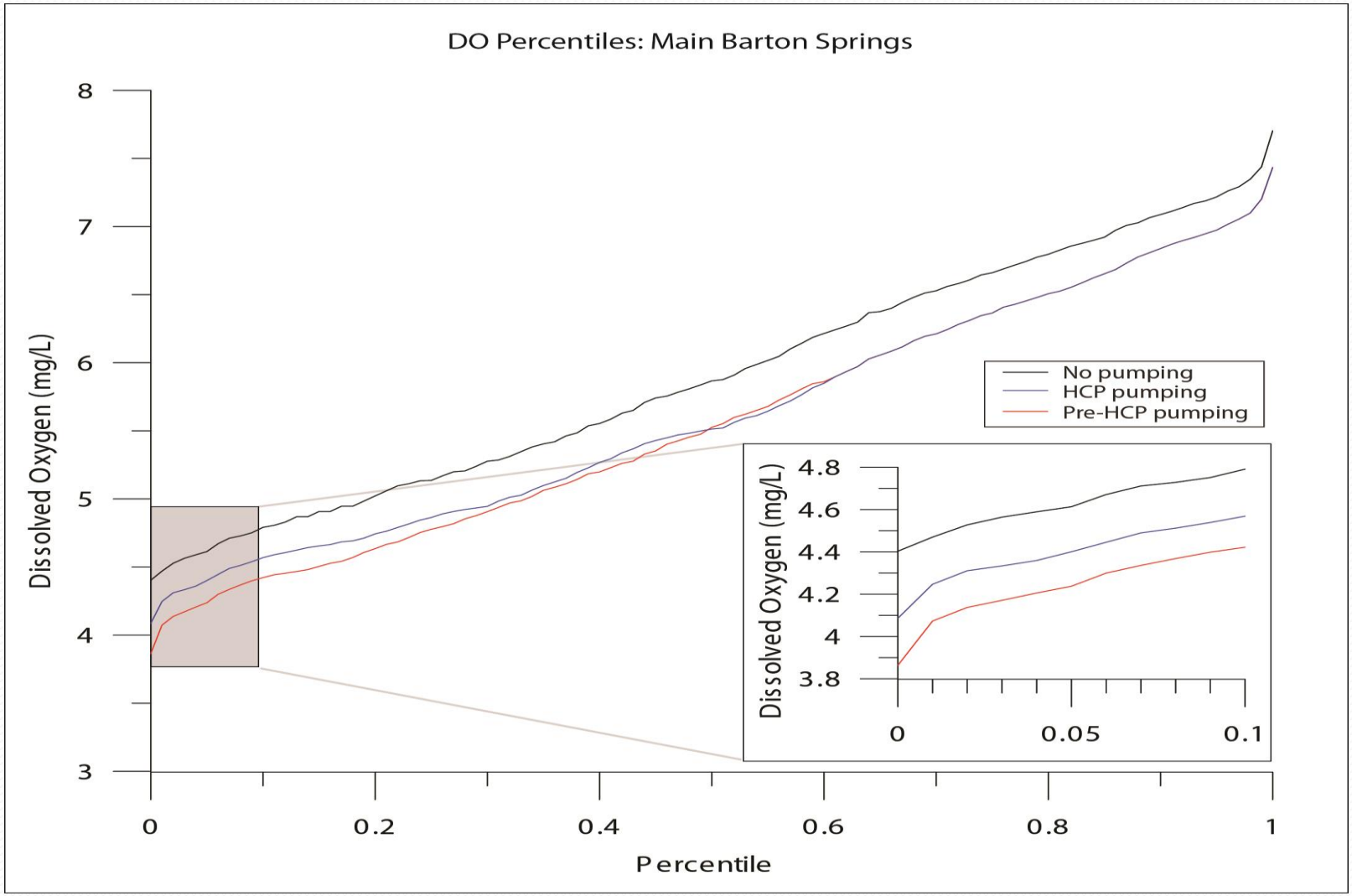
Relevant Management Thresholds		Percent of Time Springflow Is Not Exceeded in Scenario		
Aquifer Stage	**Total Springflow**	**No Pumping**	**Pre-HCP**	**HCP**
Average Flow	53 cfs	52%	61%	61%
Stage II-Alarm	38-20	36	47	44
Stage III-Critical	20-14	9	24	20
Stage IV-Exceptional	14-10	2	15	8
Emergency Response	<10	<0.01	7	3
Regulated Minimum	6.5	0	3	<1
No Springflow	0	0	<1	0

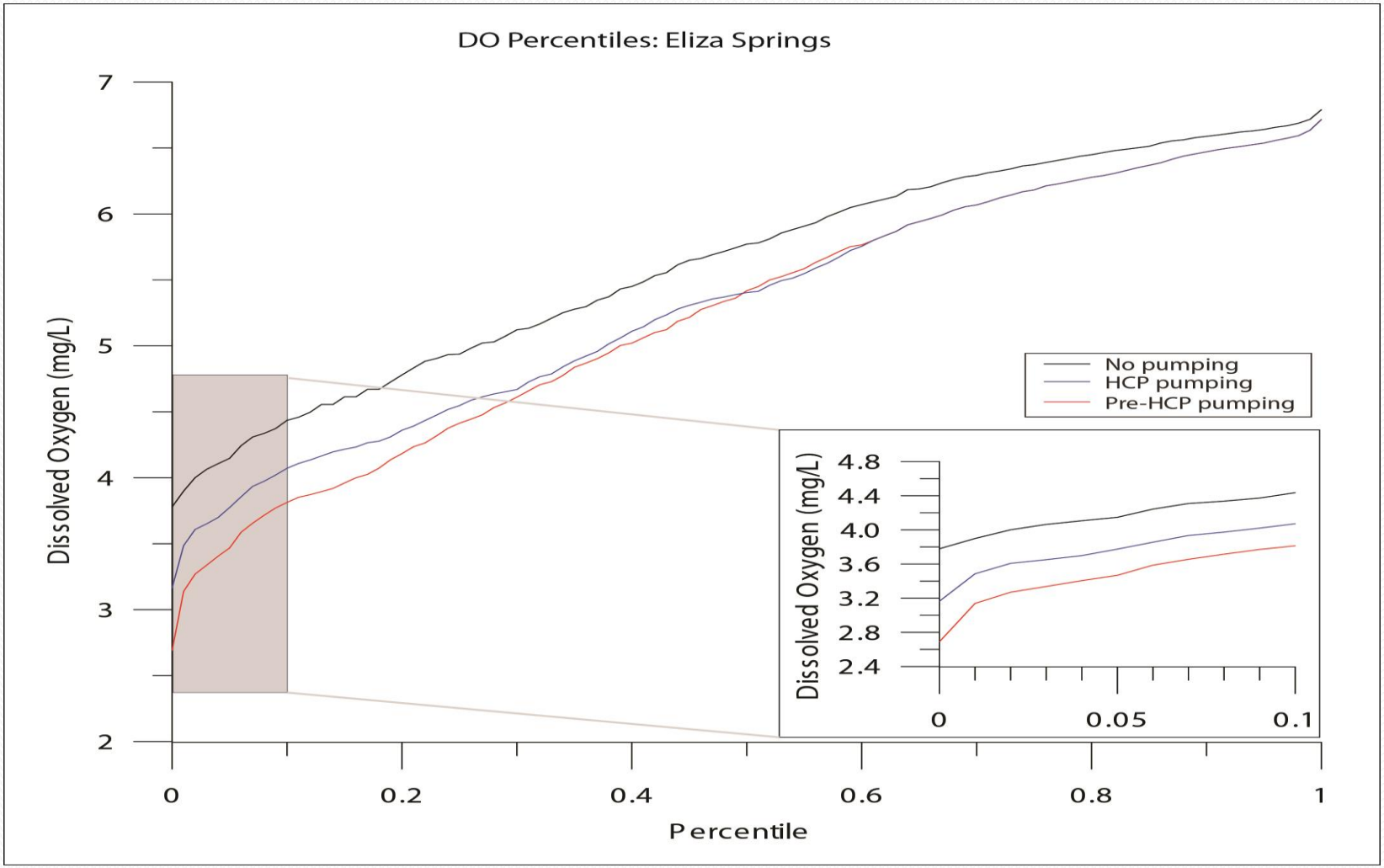
Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

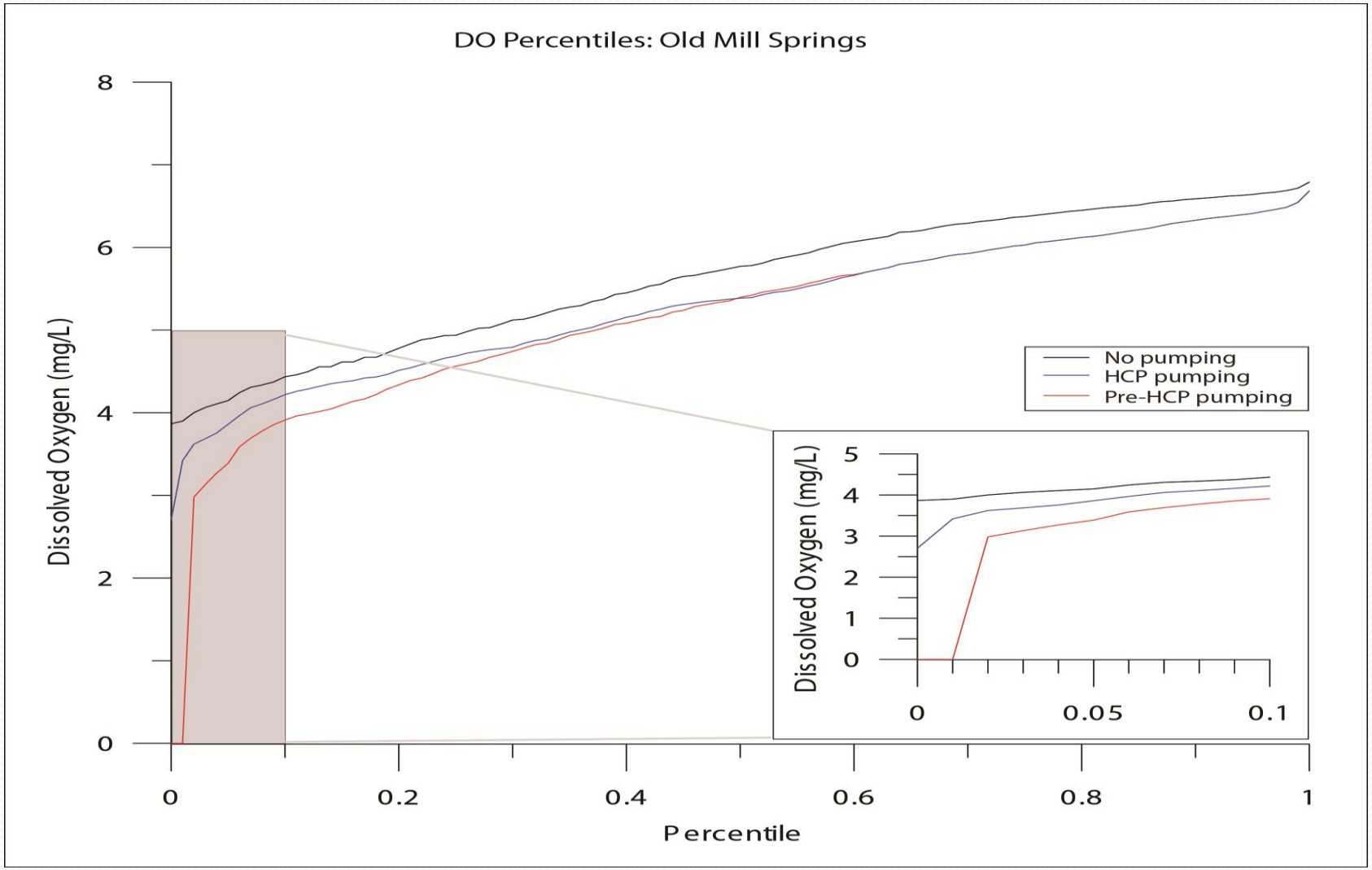
- Steps in spreadsheet modeling:
  - Developing and analyzing total springflow hydrographs for pumping scenarios
  - Associating monthly springflows and DO concentrations at each of the three perennial outlets, using two low-flow regression equations and 97-year period of record

Relevant Management Thresholds		Calculated DO Concentrations At Each of Three Spring Outlets		
Aquifer Stage	**Total Springflow**	**Main Spring**	**Eliza Spring**	**Old Mill Spring**
Average Flow	53 cfs	5.89 mg/L	5.80 mg/L	5.70 mg/L
Stage II-Alarm	38	5.41	5.29	5.30
Stage III-Critical	20	4.75	4.37	4.52
Stage IV-Exceptional	14	4.50	3.96	4.09
Emergency Response	10	4.33	3.65	3.68
Regulated Minimum	6.5	4.18	3.35	3.16
No Springflow	0	3.88	2.73	0.00

DO Levels (mg/L)	Main Outlet			Eliza Outlet			Old Mill Outlet		
	No pumping	Pre-HCP	HCP	No pumping	Pre-HCP	HCP	No pumping	Pre-HCP	HCP
4.5 or below (LC5)	2%	15%	8%	12%	27%	24%	12%	24%	20%
4.2 or below (LC10)	0%	4%	<1%	6%	209 %	14%	6%	18%	10%
3.7 or below (LC25)	0%	0%	0%	0%	8%	4%	0%	7%	3%
3.4 or below (LC50)	0%	0%	0%	0%	4%	<1%	0%	5%	1%
0	0%	0%	0%	0%	0%	0%	0%	1%	0%


DO Percentiles: Main Barton Springs
Dissolved Oxygen (mg/L)
8
7
6
5
4
3
0
0.2
0.4
0.6
0.8
1
Percentile
No pumping
HCP pumping
Pre-HCP pumping
Dissolved Oxygen (mg/L)
4.8
4.6
4.4
4.2
4
3.8
0
0.05
0.1

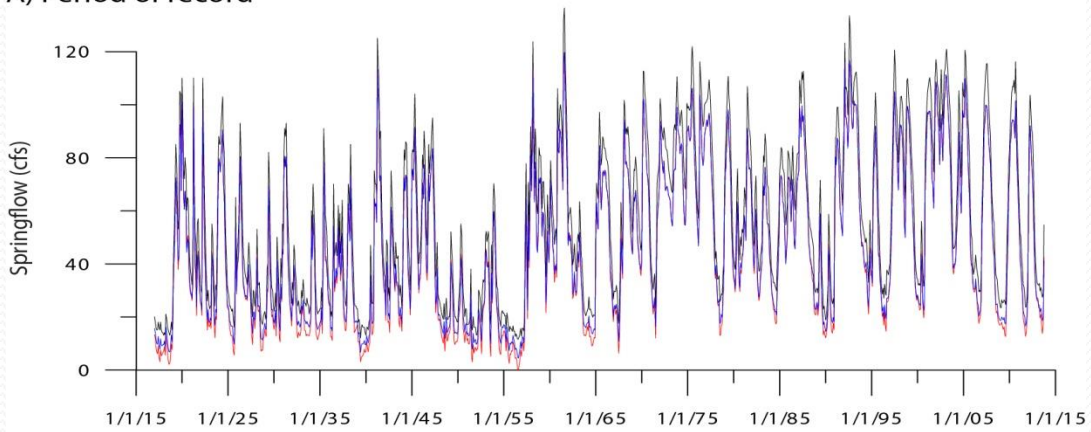

DO Percentiles: Eliza Springs
Dissolved Oxygen (mg/L)
7
6
5
4
3
2
0
0.2
0.4
0.6
0.8
1
Percentile
No pumping
HCP pumping
Pre-HCP pumping
Dissolved Oxygen (mg/L)
4.8
4.4
4.0
3.6
3.2
2.8
2.4
0
0.05
0.1


DO Percentiles: Old Mill Springs
Dissolved Oxygen (mg/L)
0
2
4
6
8
0
0.2
0.4
0.6
0.8
1
Percentile
No pumping
HCP pumping
Pre-HCP pumping
Dissolved Oxygen (mg/L)
0
1
2
3
4
5
0
0.05
0.1

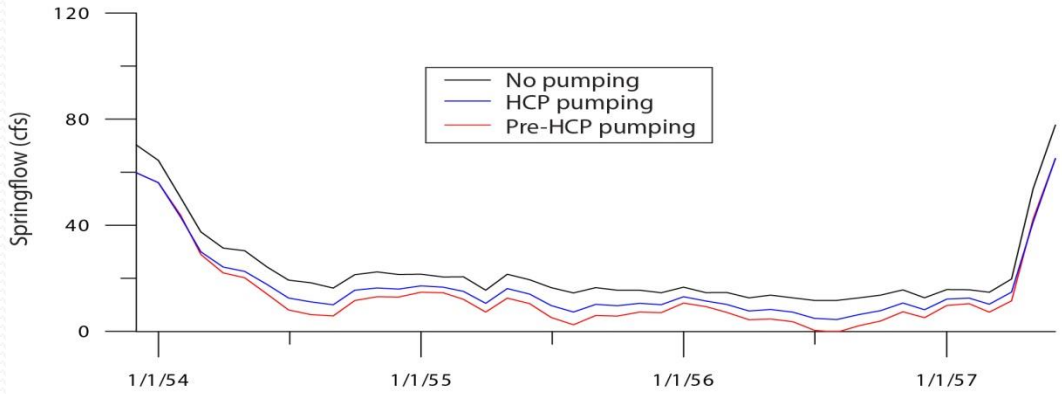
Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Steps in spreadsheet modeling:
  - Developing and analyzing total springflow hydrographs for pumping scenarios
  - Associating monthly springflows and DO concentrations at each of the three perennial outlets, using two low-flow regression equations and 97-year period of record
  - Converting DO to salamander mortality and natality estimates for each month in
    - 3.5 year DOR period, and
    - a more typical severe drought, in 2009-2011 period

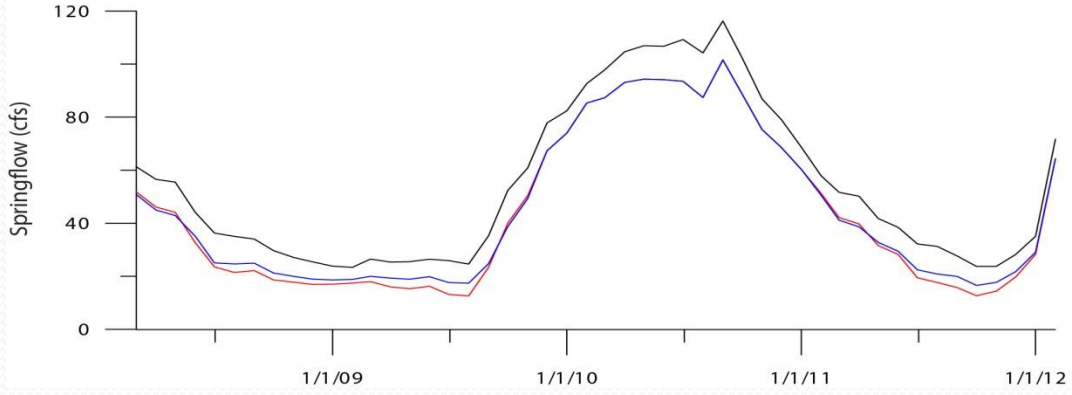
A) Period of record



B) Drought of record



C) 2009 and 2011 drought



Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Steps in spreadsheet modeling:
  - Developing and analyzing total springflow hydrographs for pumping scenarios
  - Associating monthly springflows and DO concentrations at each of the three perennial outlets, using two low-flow regression equations and 97-year period of record
  - Converting DO to salamander mortality and natality estimates for each month in (a) 3.5 year DOR period, and (b) more typical severe drought: 2009-2011 period
  - Computing take as difference in population between No Pumping and Pre-HCP pumping scenarios, and benefit of HCP in reducing take (to "net take")

Barton Springs Salamander During Drought of Record Period

Spring Outlet	Initial Populations			Residual Population for Scenarios:			Take Calculations		
	Average Total Population of Outlets	Orifice Habitat Population	Other Habitat Population	No Pumping	Pre-HCP	HCP	Lethal Take	Conservation Measures Benefit	Net Take With Benefit
Main	**104**	52	52	107	83	89	24	6	**18**
Eliza	**446**	223	223	348	40	175	308	135	**173**
Old Mill	**35**	18	18	29	0	8	29	8	**20**
ALL	**585**	**292**	**292**	**484**	**123**	**273**	**361**	**150**	**211**
	Mortality (All Causes)*			17%	79%	53%			
	Change in Initial Population From Covered Activities						-62%		**-36%**

Austin Blind Salamander During Drought of Record Period

Spring Outlet	Initial Populations			Residual Population for Scenarios:			Take Calculations		
	Average Total Population of Outlets	Orifice Habitat Population	Other Habitat Population	No Pumping	Pre-HCP	HCP	Lethal Take	Conservation Measures Benefit	Net Take With Benefit
Main	**91**	45	45	120	81	83	39	3	36
Eliza	**182**	91	91	144	24	205	121	181	-61
Old Mill	**727**	364	364	621	1	235	621	235	386
ALL	**1000**	**500**	**500**	**885**	**105**	**524**	**780**	**419**	**362**
	Mortality (All Causes)*			11%	89%	48%			
	Change in Initial Population From Covered Activities						-78%		**-36%**

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Summary of Best-Science Estimated Lethal Take:
  - For BSS during DOR worst-case, Take (Pre-HCP) is 62% of population; HCP benefit reduces Net Take to 36% of population
  - For ABS during DOR worst-case, Take (Pre-HCP) is 78% of population; HCP benefit reduces Net Take to 36% of population
  - Compare to No Pumping scenario: BSS population decreased by 17% and ABS population decreased by 11%
  - Compare to 2009-2011 severe drought: Take would be less than ½ that of the modeled DOR period.

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

But…all the values, figures, and tables in the preceding slides are going to change as we re-classify exempt use from a Covered Activity to be part of the reference baseline condition. They won't change much, and the change will generally be a smaller amount of Take.

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Take estimate involves a lot of uncertainties
  - Effect of all recharge sources on Aquifer declines
  - Magnitude of droughts likely during ITP term
  - Durations of springflows expressed as other than monthly averages
  - Likely differences between authorized (modeled) and actual pumpage by permitted groundwater users
  - Springflow-related factors other than DO concentrations
  - Covered Species population size and distribution
  - Non-modeled differences between the two species

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- Take estimate involves a lot of uncertainties (cont'd)
  - Lack of data on DO variations at extreme low flows
  - Differences in DO regimes among the spring outlets
  - Effect of DO variations on other life stages
  - Differences between predicted and observed DO levels
  - Application of laboratory data to in-the-wild conditions
  - Incorporation of springflow-related natality effects
  - Cumulative risk factors beyond the District's control.

Chapter 5: Analysis of Likely Impacts of the Taking (cont'd)

- This HCP based on robust dataset on DO stress from springflows for salamander species.
- Consequential impact of the takings on these small populations is (still) indeterminate.
- Prolonged drought similar to the worst part of the DOR without the HCP measures : modeled 80-90% reduction in population
- With the HCP: the modeled DOR population reduction is slightly more than one-third.

Chapter 6: Conservation Program

- Integrated with the Covered Activities
- Authorized by the same statutory authorities and vehicles
- Dual authorities: the District's Management Plan and the HCP supporting the ITP
- MP = groundwater management and conservation plan
- HCP = endangered species conservation plan
- Current MP includes the authorities to implement proposed HCP measures

Chapter 6: Conservation Program (cont'd)

- Biological Goals:
  - Minimize drought-related decreases in size and health of the Barton Springs salamander population to greatest extent practicable,
  - Minimize drought-related decreases in size and health of the Austin blind salamander population to greatest extent practicable, and
  - Promote recovery of the populations from those decreases to levels required for their long-term viability.

Chapter 6: Conservation Program (cont'd)

- Biological Objectives:
  - Adopt and implement groundwater management measures that:

1. Minimize the areal extent, concentration range, and duration of springflow-dependent DO at the Aquifer resurgences that is 3.3 mg/L or less under all Aquifer conditions.

Chapter 6: Conservation Program (cont'd)

- Biological Objectives (cont'd):
  - Adopt and implement groundwater management measures that:

2. Maintain minimum springflows that a scientific consensus indicates correspond to DO concentrations of a 10-day average of at least 3.9 mg/L during all but Extreme Drought conditions.

3. Do not proximally cause other natural water chemistry parameters to exceed their historical ranges at all times.

Chapter 6: Conservation Program (cont'd)

- Avoidance/Minimization Measures
  - Direct measures categorized by statutory goals of MPs
  - Measures now correspond to objectives and performance standards in our current MP
  - No Direct HCP measures require rulemaking or other Board action; by design, already consistent with MP
  - Direct HCP Measures provide required balance between
    - maximizing use of the groundwater resource, and
    - conserving and protecting that resource, including Covered Species protection.

Chapter 6: Conservation Program (cont'd)

- Some Indirect/Other HCP measures are continuing HCP-specific *research projects:*
  - Reduce uncertainties, and provide additional data for future decision-making
  - Each authorized by Board after scope, funding sources, and opportunity costs are determined
  - May involve outside entities and funding by multiple parties and sources
  - May require a specific dollar commitment by the District

Chapter 6: Conservation Program (cont'd)

Some examples of HCP-specific *research projects:*

- The District will work with universities, the City of Austin, and other qualified parties to:
  - conduct surveys of the temporal and spatial DO variability of the Aquifer and the surface environments around Barton Springs Pool, and
  - continue financially contributing to stressor-response studies of salamander species to inform risk associated with springflow-related changes in water chemistry.

- The District will work with other qualified parties to
  - develop a refined conceptual model to improve the numerical models for the District aquifers, and
  - Improve geohydrological characterization of aquifer performance during extreme low flows.

Chapter 6: Conservation Program (cont'd)

- Some Indirect/Other HCP measures are HCP-specific *mitigation:*
  - Offsets the inability of the District's Covered Activities to avoid take
  - May be continuing commitments of in-kind and other resources for specific beneficial purpose
  - May be special projects pre-authorized by the HCP but subject to Board approval of scope, funding sources, and opportunity costs
  - May involve outside entities and funding by multiple parties and sources
  - Typically requires specifying value of commitment

Chapter 6: Conservation Program (cont'd)

Some examples of HCP-specific *mitigation:*

- The District will enter into an Inter-local Agreement (ILA) with the City of Austin to establish a protocol for supporting and conditionally using the City-maintained refugium to:
  - continue the study of salamander behavior, and
  - conserve wild and captive populations

- The District, in cooperation with the City of Austin, will conduct feasibility studies and possibly pilot projects to evaluate the potential for beneficial dissolved oxygen augmentation during extreme drought conditions.

Chapter 6: Conservation Program (cont'd)

- Monitoring program:
  - Annual validation monitoring, as specified
  - Every five years: HCP performance metrics evaluation
  - Continuing implementation and effectiveness monitoring
- Generally consistent with MP performance standards; will require some additional staff time and resources
- Requires data and analysis from City of Austin under the prospective ILA

Chapter 6: Conservation Program (cont'd)

- HCP Reporting:
  - Annual report to FWS
    - Groundwater management data and research
    - Groundwater management actions
    - Species-specific research studies related to biological objectives
  - Draft shared with District's Management Advisory Committee
  - Will adjust schedules to integrate with current annual reporting to TCEQ and minimize additional staff time and effort
  - Requires information from City of Austin under the prospective ILA for our HCP
  - Requires information to be furnished to City of Austin under the same prospective ILA for its HCP

Chapter 6: Conservation Program (cont'd)

- Management Advisory Committee:
  - Internal advisory committee to Board as a continuous HCP improvement function
  - Provide *ad hoc* review and comment on HCP matters, compliance issues, and AMP
  - Reviews HCP Annual Report and issues letter-style report to Board on progress and concerns
  - Every five years, reviews the District report on HCP performance metrics, and makes recommendations as to adjustments and improvements
  - Intended to be self-directed, but some staff time and effort needed for coordination

Chapter 6: Conservation Program (cont'd)

- Inter-local Agreement with City of Austin:
  - Provides content that City's biologists will furnish for biological/ecological info required by this HCP
  - Potential vehicle for collaborating on mitigation projects and research projects
  - Board authorizes all provisions of initial ILA and any amendments
  - Term through September 2033
  - Pre-negotiation discussions with City staff now underway

Chapter 6: Conservation Program (cont'd)

- Possible Elements of ILA with City of Austin:
  - Annual Report inputs
  - Public education
  - Flow measurement
  - Monitoring
  - Regional cooperation
  - Recharge enhancement
  - Groundwater withdrawal
    - Collaborating on science basis for DFCs
    - Assessing alternate water supplies, including AWU interconnects
    - Continue prohibiting re-permitting of retired historic-use production and new recharge from joint recharge enhancement projects
    - Sharing information on new wells in City's and District's jurisdictions

Chapter 6: Conservation Program (cont'd)

- Adaptive Management Plan
  - FWS/DOI has active, structured AMP process that HCP/ITP permittees are required to use, where feasible and appropriate
  - FWS: The District HCP measures not amenable to this AMP protocol
  - We will use only our own "incremental rational approach" to AMP for these

Chapter 7: Changed and Unforeseen Circumstances

- FWS Definitions:
  - Changed Circumstances = reasonably foreseeable substantive changes that affect the ITP, *and* that are *not un*likely to occur during the ITP term
  - Unforeseen Circumstances = circumstances during the ITP term that are not easily foreseeable
- Both require consultations with FWS to ascertain/confirm type and responsible entity
- "No surprises": requirements delineated in HCP

Chapter 7: Changed and Unforeseen Circumstances (cont'd)

- Changed Circumstances:
  - Most arise from uncertainties
  - Required action only on those circumstances identified in approved HCP
  - District is responsible only for response specified in this part of HCP
  - Response for Changed Circumstances are HCP commitments = limited to those that District can effect/control

Chapter 7: Changed and Unforeseen Circumstances (cont'd)

- Identified Changed Circumstances:
  1. Listing of new species in ITP area not covered by HCP

     Response: Commitment to other needed conservation measures within our regulatory authority and financial wherewithal

     Extraordinary Requirement: None known; additional required staff labor is indeterminate but believed manageable
  2. Drought with *unexpectedly, sustained* low DO levels

     Response: If DO Augmentation project is feasible and in place: trigger operation and monitor DO, continuing until weekly average DO at Main and Eliza Springs is above 4.5 mg/L. If DO Augmentation is infeasible: Board issues series of Orders to selected permittees for additional temporary curtailments until DO at outlets is above 3.7 mg/L.

     Extraordinary Requirement: Rule change but no MP revision, before ITP issuance; additional required staff labor is indeterminate but believed manageable

Chapter 7: Changed and Unforeseen Circumstances (cont'd)

- Identified Changed Circumstances:
  3. Increased use of exempt wells in ITP Area (5-year analysis)

     Response: Adjust Drought MAG by GAM change if supportable with GMA 10; otherwise, make proportional reduction in allowable production from non-exempts during Stage IV drought

     Extraordinary Requirement: Confirm no legal impediments at the time; additional required staff labor is indeterminate but believed manageable
  4. Substantial change in statutory, legal, or financial wherewithal to execute the conservation measures according to the ITP

     Response: Assess impact o take and work with FWS to either prioritize HCP measures to minimize effect on net take, or amend the ITP/HCP, or other remedial actions.

     Extraordinary Requirement: Commit reserve funds until Changed Circumstance is resolved; additional required staff labor is indeterminate but believed manageable

Chapter 7: Changed and Unforeseen Circumstances (cont'd)

- Unforeseen Circumstances:
  - Upon confirmation, FWS has burden to respond, provided District has fully implemented its HCP
  - FWS uses procedures defined in its regulations in responding to Unforeseen Circumstances
  - Some additional, indeterminate staff labor but believed manageable; likely part of ongoing related evaluations
- Other things may trigger need to amend ITP/HCP:
  - Amendment may be initiated by District or FWS
  - Requires classification as to major or minor amendment to delineate type of response

Chapter 8: HCP Funding Assurances

- For funding of measures, HCP=MP and MP=HCP
- HCP funding is same as current funding and its sources
- HCP funding commitment is mostly cost of District labor, plus expenses for goods and services
- Need flexibility in defining applicable expenses year to year, so a minimum annual expenditure is specified
- $942,000 annually is the authorized water use fee associated with the amount of pumpage corresponding to the Extreme Drought DFC.
- Actual HCP/MP funding will typically be much greater.
- Annual financial audit used to demonstrate expenditure.
- Use Annual Report to identify upcoming extraordinary HCP projects and current exigencies.

Chapter 9: Alternatives to Taking

- During drought*, any well withdrawals produce take
- Corollary: to avoid take no covered wells could produce any Edwards water during those times
- Therefore: no feasible alternative to the taking:
  - Demand reduction – District legally cannot order complete cessation of pumping by a landowner; it's a vested property right.
  - Supply enhancement and substitution – Mandating complete substitution is not statutorily, economically, or even physically feasible
- Proposed HCP comprises the Enhanced Best Attainable Management Alternative that achieves the DFCs
- Proposed HCP designed to minimize risks of both incidental take and compensable regulatory take.

Chapter 10: Other Information That Secretary of Interior May Require

- Required assurance: no other information besides that elsewhere in the HCP is known to be required to be presented in order to be in compliance with FWS regulations
- FWS or DOI has not identified such information for this HCP at this time.

End of Tonight's Work Session

- Other questions/comments on Chapters 5 through 10?
- Consensus on flagged changes to be made in Chapters 5-10?
- For Open Session:
  - Approving milestone schedule
  - Approving conditional release of revised MAC Review Draft HCP to MAC