# Kansas Thinking on Bacteria Water Quality: Uses, Criteria and TMDLs

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# Prevailing Issues Regarding Bacteria Impairments

- What criteria are applicable to flowing waters?
- Are low flow criteria applicable at high flow?
- Where should criteria apply: truly swimable streams or all waters?

# Kansas Approach to Bacteria

- Mandatory Wastewater Disinfection
- Refinement of Uses
  - Primary A: Swimming Beaches (None in KS)
  - Primary B: Swimmable and Accessible
  - Primary C: Swimmable and Limited
  - Secondary a: Shallow and Accessible
  - Secondary b: Shallow and Limited

# Kansas Stream Recreation Uses & Criteria

## *(E. coli Geometric Means of 5-in-30)*

| Likelihood of Recreation Use | Depth of Water Exceeds 0.5 m | Depth of Water is Under 0.5 m |
|---|---|---|
| **Swimming Beach** | 160 Apr-Oct<br>2358 Nov-Mar | ---------- |
| **Open and Accessible** | 262 Apr-Oct<br>2358 Nov-Mar | 2358 All Year |
| **Restricted Accessibility** | 427 Apr-Oct<br>3843 Nov-Mar | 3843 All Year |

# The TMDL/UAA Sequencing: Which comes first?

- Point Sources tend to want UAAs first, then TMDLs, then investment in treatment
- Non-Point Sources tend to want TMDLs first, garner the resources for water quality implementation, then worry about WQS
- Urban Stormwater has tended to invest first (originally flood control), interacted with TMDLs (BMP selection); and is now raising the Recreation UAA question.

# Implications of UAAs

- There are two questions addressed by UAAs
- 1. Is the use present or attainable or not?
  - But Recreation is a CWA 101(a) use, therefore, the question really is: Is this a stream or not?
- 2. Under what conditions is the use present or attainable?
  - Seasonality of Use
  - Hydrologic Constraints on Use
  - Public Interaction with Resource

# Recreation UAA Complications

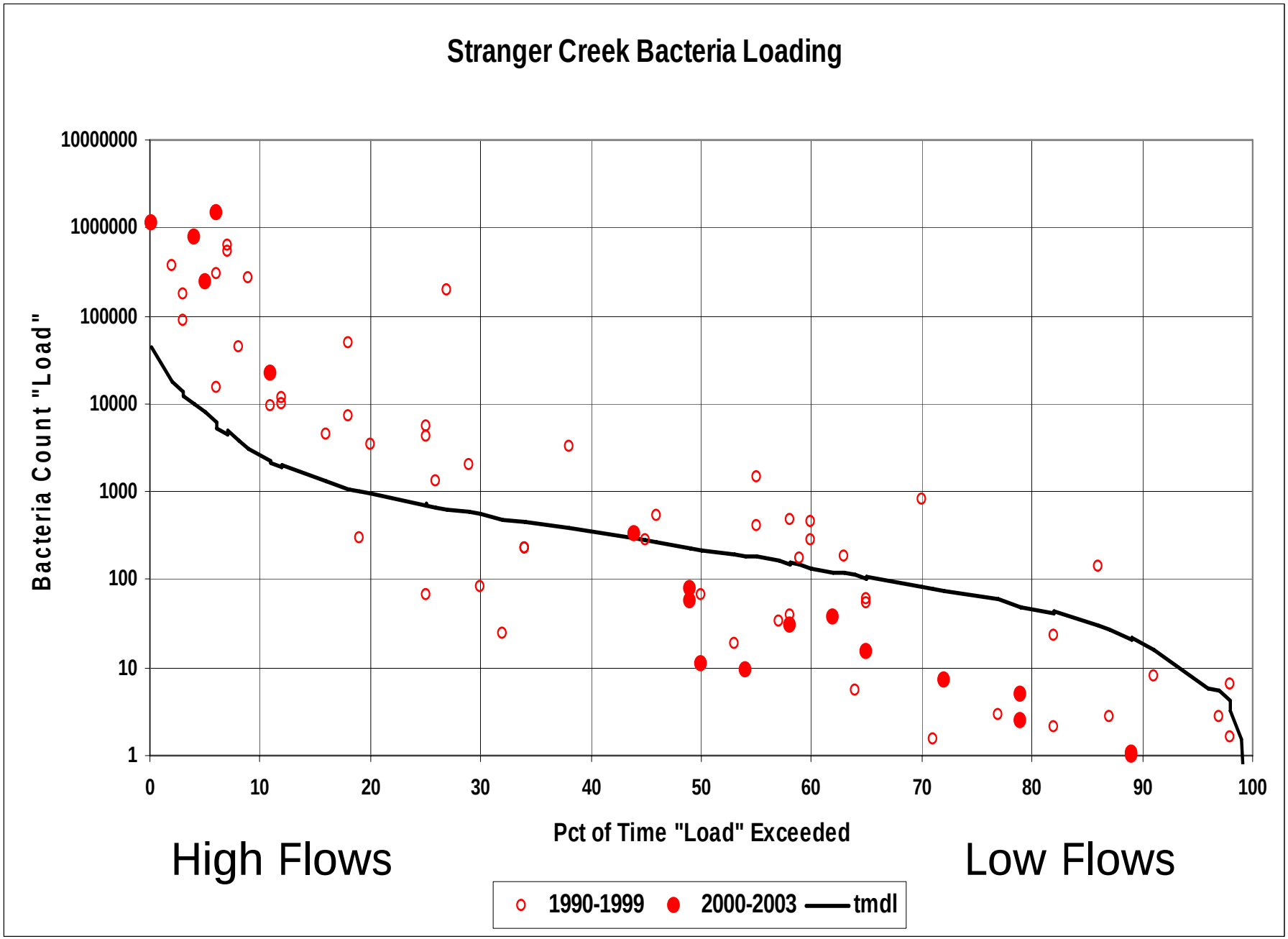
- **Stream assessed at three sites, two have shallow flow, third has a pool caused by clogged culvert – Primary or Secondary?**
- **Same situation, but pool is in headwaters – is the whole stream Primary?**
- **Shallow stream runs through park with kids present daily – is public safety assured by a Secondary designation?**
- **Impaired main stem has Primary Rec, entire drainage is tributaries with Secondary Rec – what are the bounds of any bacteria TMDL?**
- **When do you do the UAA? – Spring or Fall?**

# Factors Driving Public Preference for Stream Recreation on Stranger Creek

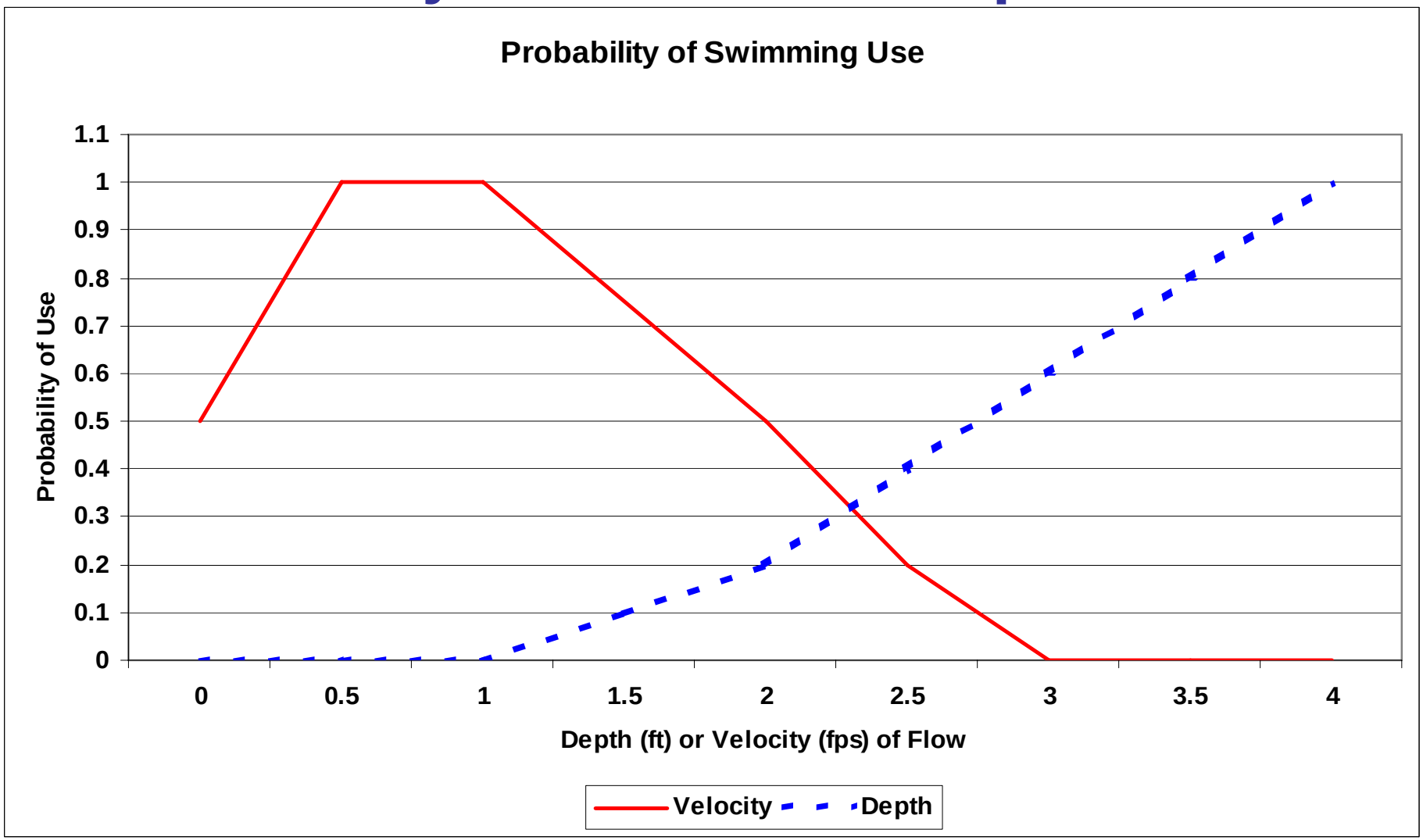
| Month | Air T | Water T | Median Flow | Avg Depth | Avg Velocity |
|---|---|---|---|---|---|
| April | 68 deg | 54 deg | 97 cfs | 1.16 ft | 1.25 fps |
| May | 77 deg | 63 deg | 111 cfs | 1.22 ft | 1.29 fps |
| June | 85 deg | 72 deg | 83 cfs | 1.10 ft | 1.22 fps |
| July | 91 deg | 79 deg | 28 cfs | 0.76 ft | 0.98 fps |
| August | 89 deg | 77 deg | 13 cfs | 0.58 ft | 0.84 fps |
| Sept | 81 deg | 73 deg | 10 cfs | 0.53 ft | 0.79 fps |
| Oct | 70 deg | 61 deg | 11 cfs | 0.55 ft | 0.81 fps |

# Kansas Approach to Bacteria

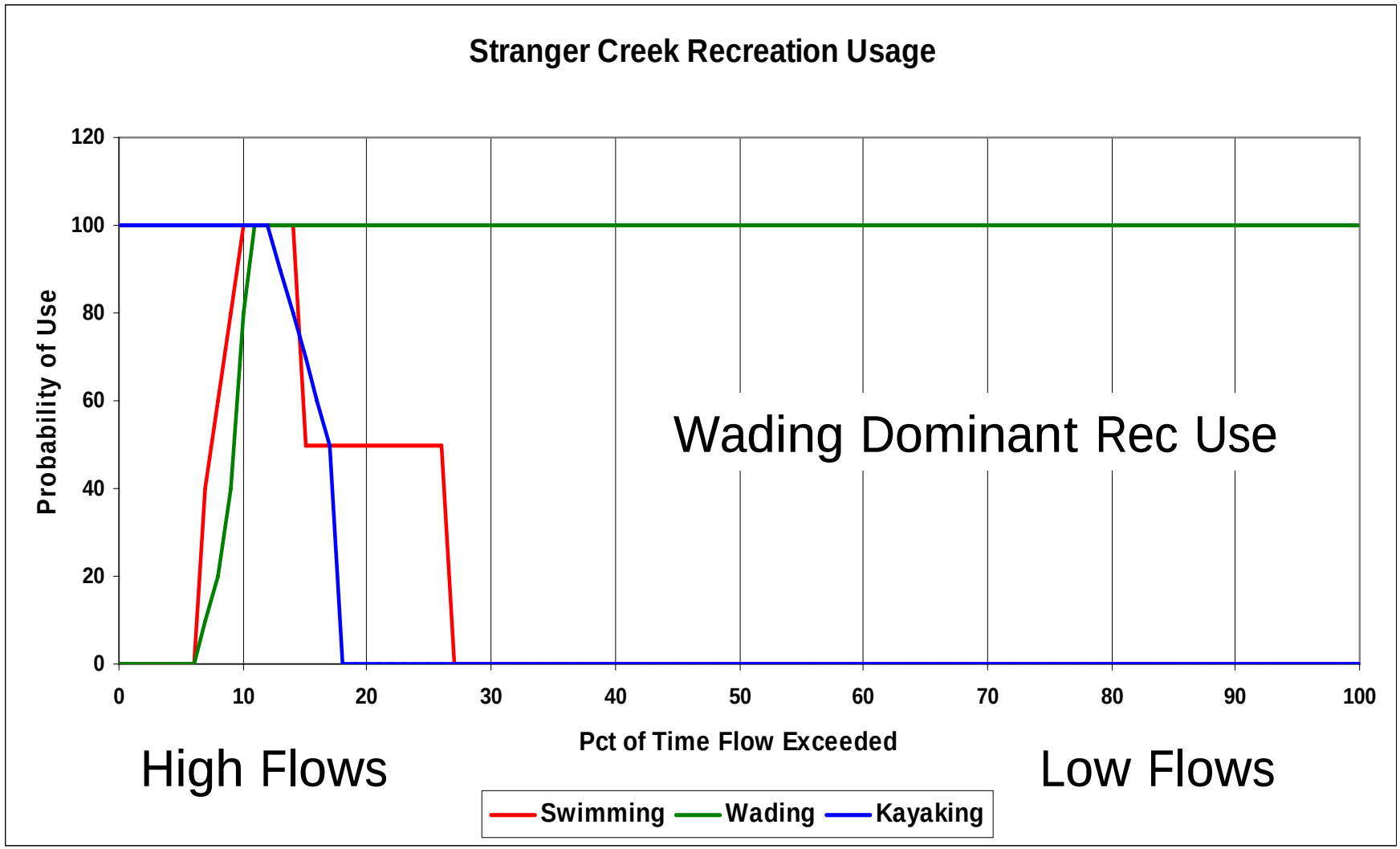
- High Flow Exclusion
  - Physical Risks >>> Pathogen Risks
  - Not Approved by EPA (Kayaker Protection)
- Load Duration Curves – TMDLs demonstrating impairments at higher flows


Stranger Creek Bacteria Loading
10000000
1000000
100000
10000
1000
100
10
1
Bacteria Count "Load"
0
10
20
30
40
50
60
70
80
90
100
Pct of Time "Load" Exceeded
High Flows
Low Flows
1990-1999
2000-2003
tmdl

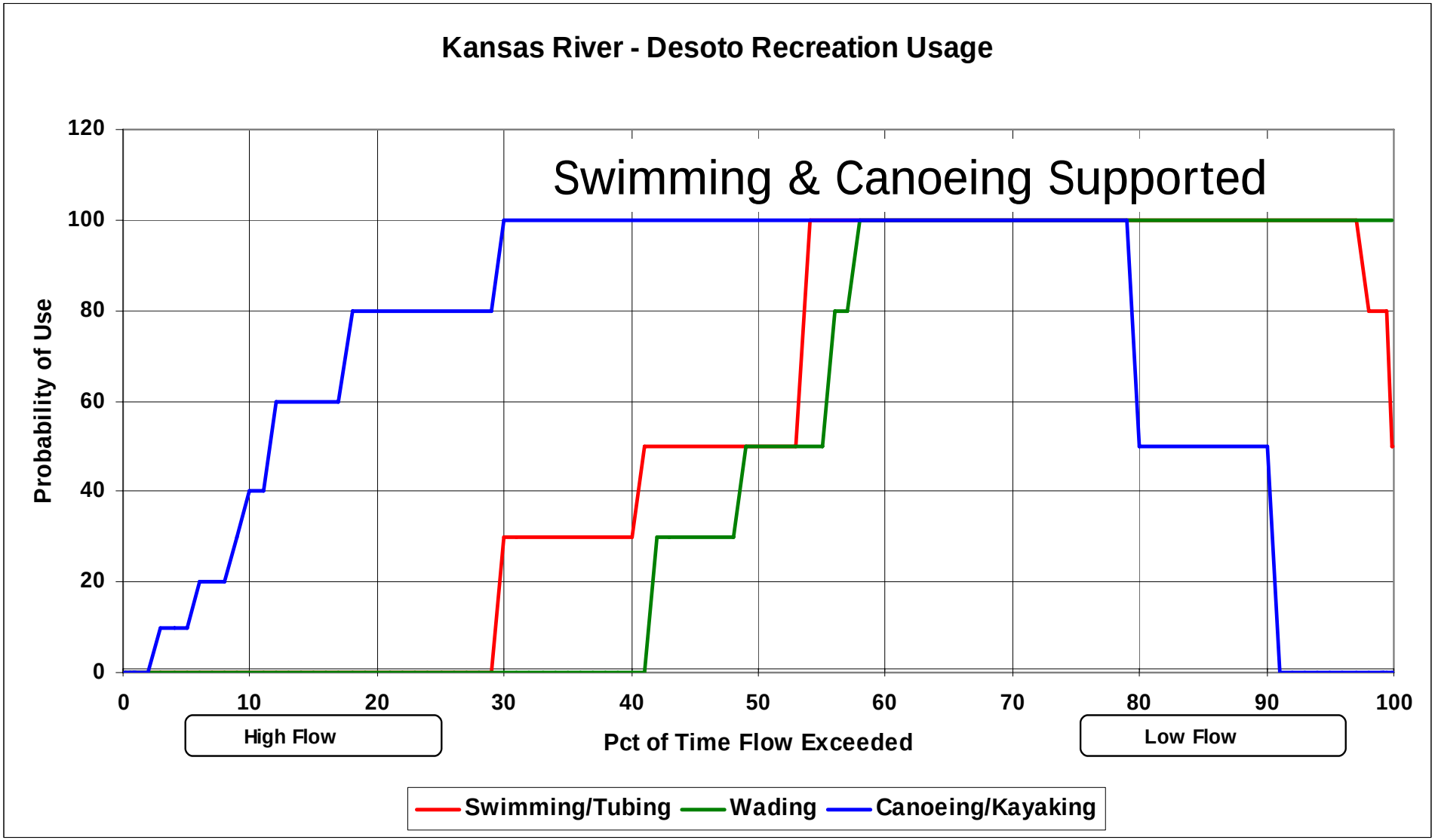
# Instream Flow Studies Suggested Probability of Use Is Flow-Dependent

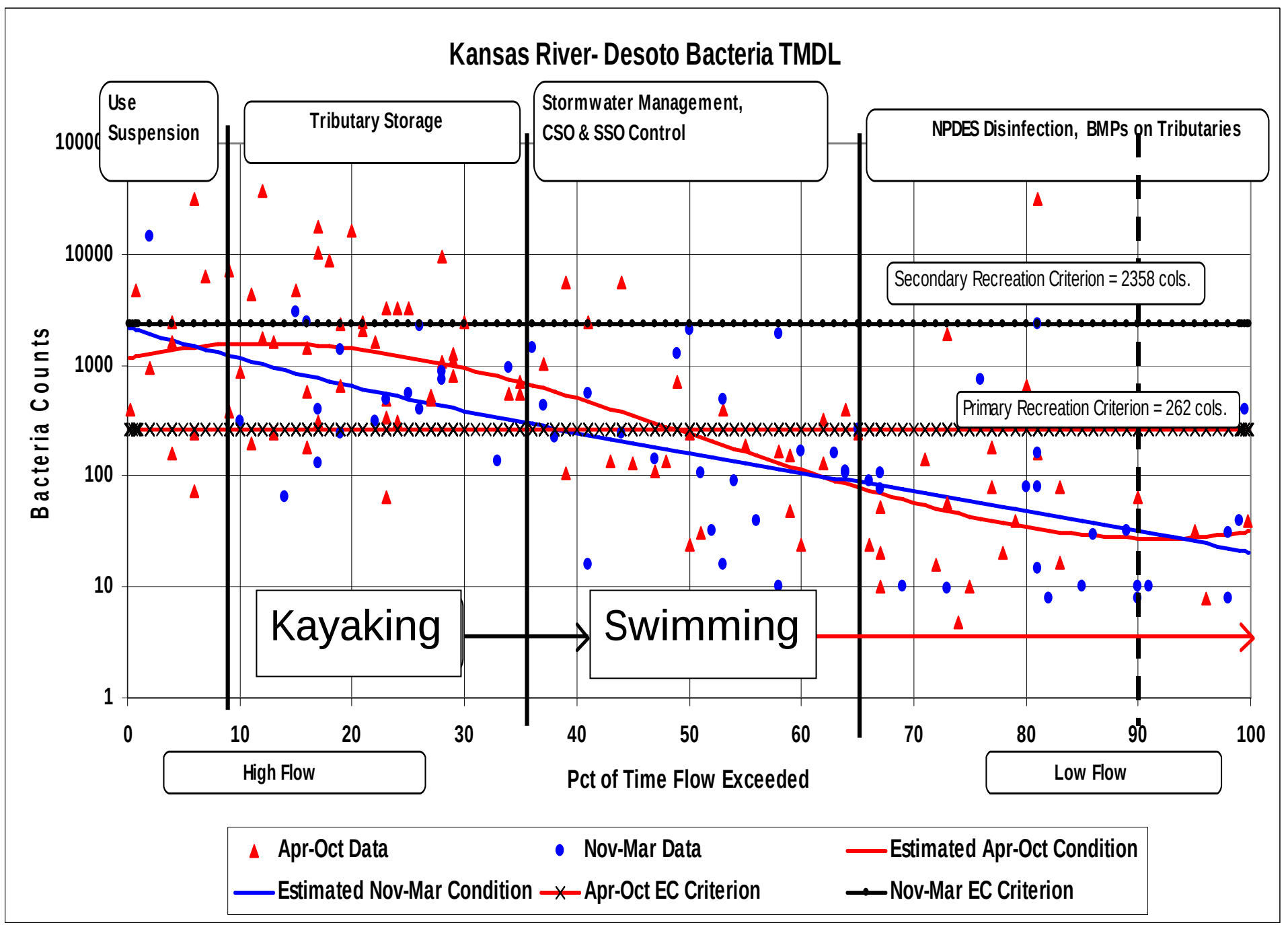


# Narrow Window of Primary Recreation Potential



# High Probability of Recreation Use




Kansas River- Desoto Bacteria TMDL
Use Suspension
Tributary Storage
Stormwater Management, CSO & SSO Control
NPDES Disinfection, BMPs on Tributaries
Secondary Recreation Criterion = 2358 cols.
Primary Recreation Criterion = 262 cols.
Kayaking
Swimming
Bacteria Counts
10000
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
High Flow
Pct of Time Flow Exceeded
Low Flow
Apr-Oct Data
Nov-Mar Data
Estimated Apr-Oct Condition
Estimated Nov-Mar Condition
Apr-Oct EC Criterion
Nov-Mar EC Criterion

# The philosophy on recreation use affects everything

- Absolutism: Recreation should be supported Anytime, Anywhere for Anybody; or,
- ST2-WoK: The needs of the many outweigh the needs of the one or the few
  - Dictates the Rigor of Review Analysis
  - Influences the Dedication of Resources for Implementation
  - Rejects/Accepts there are Conditions of Perpetual Impairment

# An Appeal for Collaboration

- Kansas WRAPS:  Watershed Restoration and Protection Strategy
- A planning and management framework to engage stakeholders to:
  - Identify restoration needs
  - Establish goals
  - Derive plan to achieve goals
  - Implement the plan

# WRAPS Process

- 1. Development – Recruit stakeholders and determine interests
- 2. Assessment – Review watershed conditions and develop expectations
- 3. Planning – Establish goals and identify and select cost-effective actions to achieve goals
- 4. Implementation – Put plan in motion, secure resources, monitor progress, make revisions

# Conclusions

- **1. In the end, how bacteria criteria are applied to a given water may be more critical than the use designation of that water**
- **2. Stream hydrology influences bacteria criteria & loadings, potential recreation use and corrective management practices**
- **3. Attaining “Swimable” Use should concentrate where use exists, proximity to urban centers and where stream hydraulically supports recreation.**
- **4. Rural stream emphasis should be on impact to downstream rivers, not on recreation use on the stream itself.**

# Conclusions, cont.

- **5. Public recreation on streams is weighted toward tranquil flow, warm weather conditions – summertime impairments are first priority.**
- **6. Investment in corrective practices should focus on reducing bacteria at lower flows first; then be very selective where to invest high flow controls**
- **7. Embrace European philosophy: protect water where recreation actually takes place**
- **8. Collaborative efforts are necessary to secure the recreation function in surface waters - Pathogens are but one factor of those efforts**