

# **A “Growing” Issue: Resource impacts of medical marijuana cultivation**



**Department of Fish & Wildlife  
Northern Region  
Coastal Conservation Planning**



# The Green Rush is on!





# Natural Resource Impacts

- **Pollutants: Sediment, petroleum products, fertilizers, killing agents**
  - **No BMPS/ No Riparian & Stream Protection Areas**
  - **Conversion/Fragmentation of lands**
  - **Water Diversion: During low-flow periods, no screening, oversized pumps**
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- A photograph of a stream with several rows of straw bales placed across it to filter sediment. The water is murky and brown, indicating high sediment levels. The background shows a wooded area with bare trees, suggesting a rural or agricultural setting. The text is overlaid on the image in a bold, white font.



# Affected Fish and Wildlife



James Bettaso  
U.S. Fish and Wildlife Service





# DFW Case Study

- Mapped grows in two watersheds
- Counted plants and greenhouses
- Estimated water use
- Developed water budget
- Measured growth in activity from 2009 to 2012





# Methodology

- Using high-resolution aerial imagery (dated 8/23/2012) in Google Earth™ as a reference, features were mapped in ArcMap10.0™.
- Watershed boundaries and a grid with 1-km<sup>2</sup> cells were displayed in both Google Earth™ and ArcMap10™, enabling easy navigation between the two programs cell by cell.

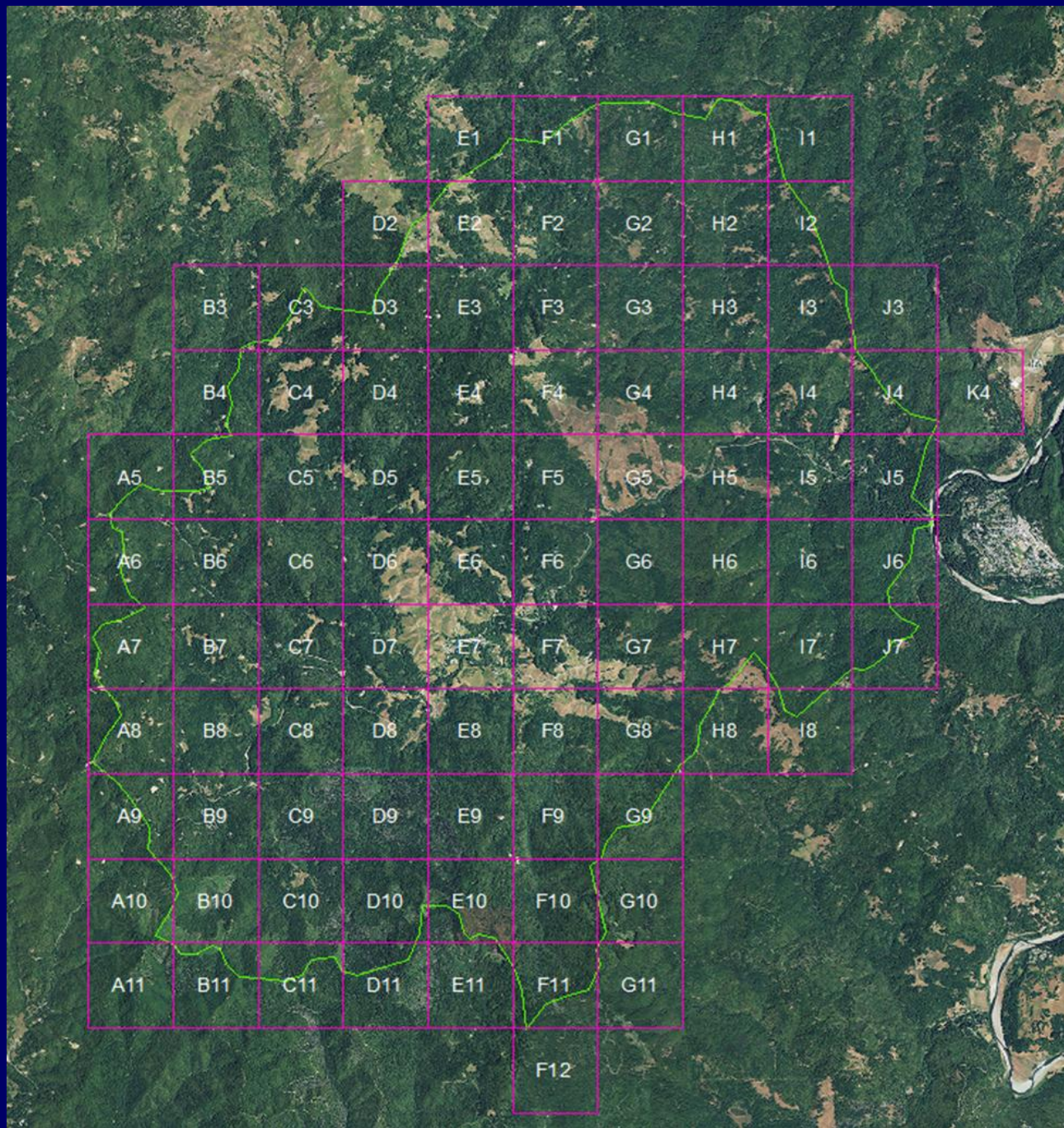


# The mapping and data collection were accomplished as follows:

- Greenhouses, outdoor grows, and dwellings were identified using Google Earth™, and were mapped as points.
- Rectangular features were measured (with Google “Ruler” measuring tool) to obtain area, and plants were counted at grow sites.
- Ponds and clearings associated with marijuana grows were digitized as polygons, and areas were calculated in ArcMap10™.
- Imagery from years 2009, 2010, and 2012 were compared to determine if land area of grows increased during that period.
- Water demands were estimated using above data in conjunction with calculations provided in an industry document (HGA 2010).

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# Documentation from an emerging industry

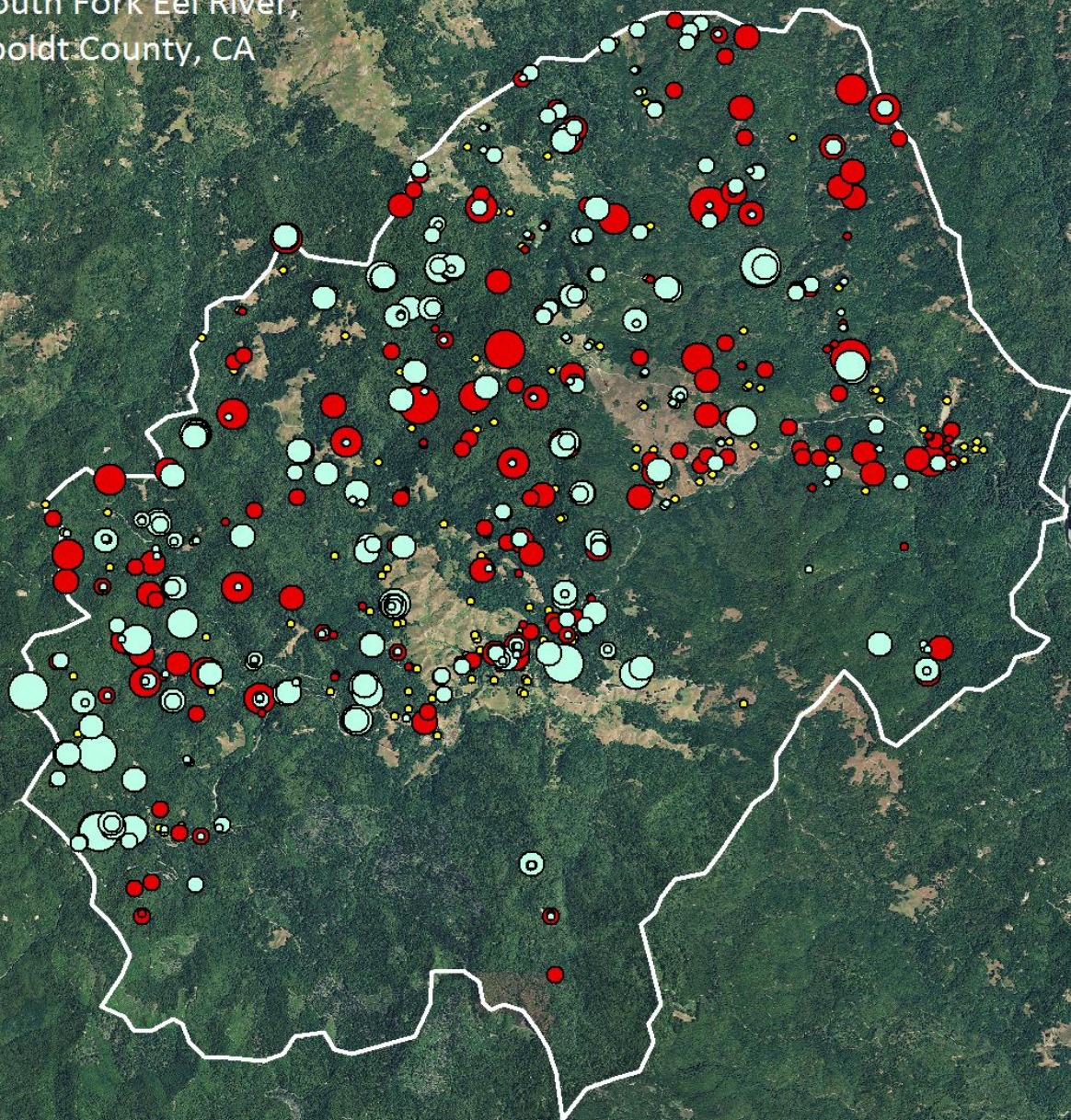
These numbers account for a watering season that runs from June thru October. Please note that this watering period can vary greatly. If it is a very wet spring the planting season may be delayed and conversely if it is a dry spring the planting season may be in May. I would also like to note that October also has variables associated with water usage. There is the potential for cannabis to finish in September. This is largely strain and growing style dependent. In a five-month period there are approximately 150 days multiplied by 6 gallons of allotted water usage per plant per day and each plant may consume 900 gallons per season. The following information is an estimate of water usage for various size permits.

## Water Usage Based on 5' x 5' Plants

- 5,000 sq. ft. = 180,000 gallons of water
- 10,000 sq. ft. = 360,000 gallons of water
- 20,000 sq. ft. = 720,000 gallons of water
- 40,000 sq. ft. = 1,440,000 gallons of water



Redwood Creek, Tributary of  
the South Fork Eel River,  
Humboldt County, CA



**Legend**

Watershed Boundary (23.3 mi<sup>2</sup>)

Residences Estimated Total Water Use  
Per Day: 49,170 Gal

**Greenhouses**

**Area in Square Feet**

60 - 350	Total Area of Greenhouses: 201,444 ft <sup>2</sup>
351 - 665	Estimated Total Water Use Per Season: 7,251,984 Gal
666 - 1280	Estimated Total Water Use Per Day: 48,346 Gal
1281 - 2720	
2721 - 4800	

**Outdoor Grows**

**Number of plants**

5 - 23	Total number of outdoor plants: 10,475
24 - 47	Estimated Total Water Use Per Season: 9,427,500 Gal
48 - 85	Estimated Total Water Use Per Day: 62,850 Gal
86 - 185	
186 - 334	

\* Water use estimates derived from HGA Medical Cannabis Ordinance 2012





# Salmon Creek, Tributary of the South Fork Eel River, Humboldt County, CA

**Legend**

Watershed Boundary (36.9 mi<sup>2</sup>)

● Residences Estimated Total Water use per Day: 31,680 Gal

**Greenhouses**

**Area in Square Feet**

<ul style="list-style-type: none"> <li><span style="border: 1px solid black; border-radius: 50%; width: 10px; height: 10px; display: inline-block; margin-right: 5px;"></span> 78 - 540</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 15px; height: 15px; display: inline-block; margin-right: 5px;"></span> 541 - 1008</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: inline-block; margin-right: 5px;"></span> 1009 - 2100</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 25px; height: 25px; display: inline-block; margin-right: 5px;"></span> 2101 - 3510</li> <li><span style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: inline-block; margin-right: 5px;"></span> 3511 - 6000</li> </ul>	<p>Total Area of Greenhouses: 225,013 ft<sup>2</sup></p> <p>Estimated Total Water Use per Season: 8,100,468 Gal</p> <p>Estimated Total Water Use per Day: 54,003 Gal</p>
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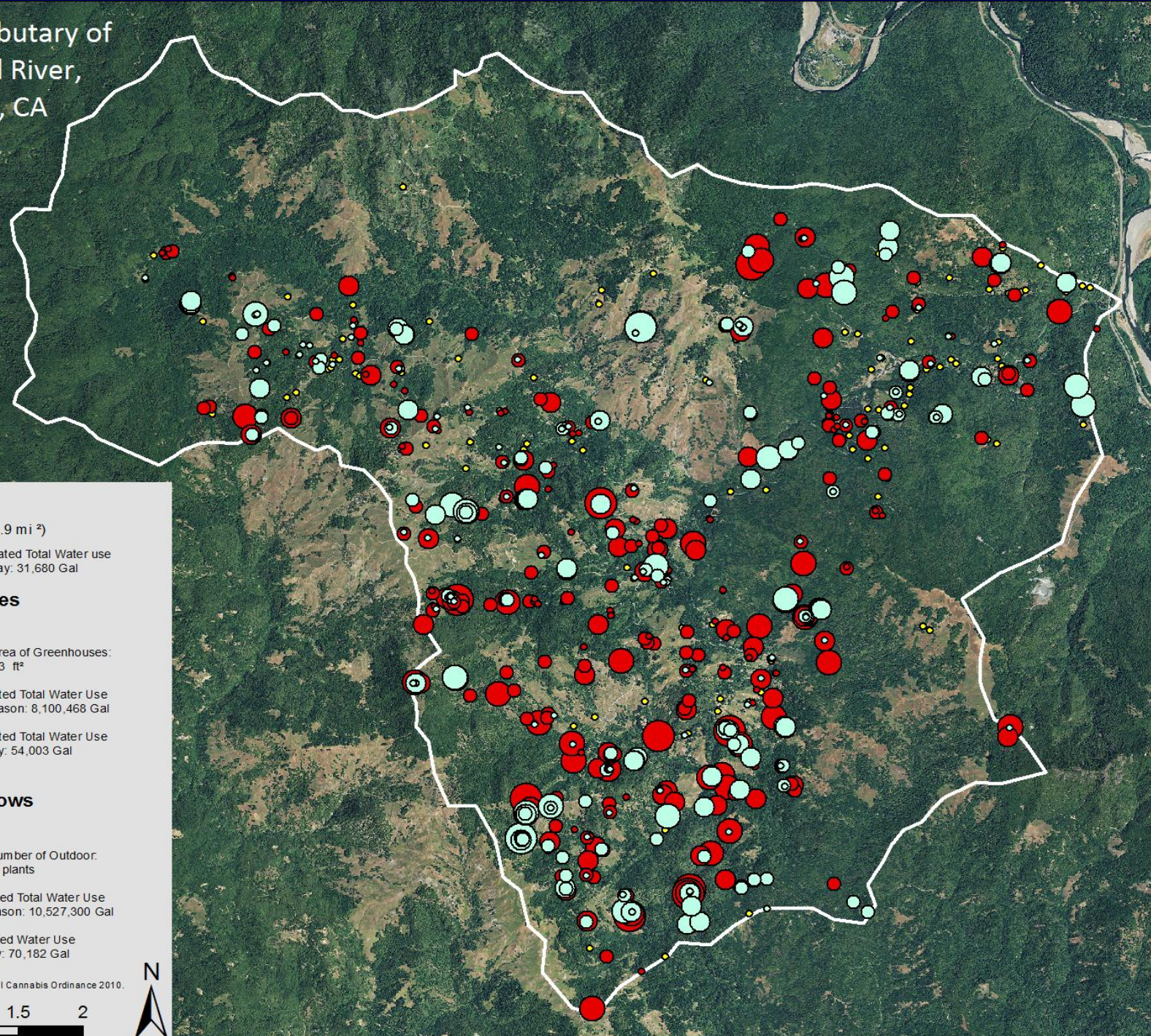
**Outdoor Grows**

**Number of Plants**

<ul style="list-style-type: none"> <li><span style="color: red; font-size: 0.8em; margin-right: 5px;">●</span> 0 - 19</li> <li><span style="color: red; font-size: 1em; margin-right: 5px;">●</span> 20 - 38</li> <li><span style="color: red; font-size: 1.2em; margin-right: 5px;">●</span> 39 - 65</li> <li><span style="color: red; font-size: 1.5em; margin-right: 5px;">●</span> 66 - 120</li> <li><span style="color: red; font-size: 2em; margin-right: 5px;">●</span> 121 - 350</li> </ul>	<p>Total Number of Outdoor: 11,697 plants</p> <p>Estimated Total Water Use per Season: 10,527,300 Gal</p> <p>Estimated Water Use per Day: 70,182 Gal</p>
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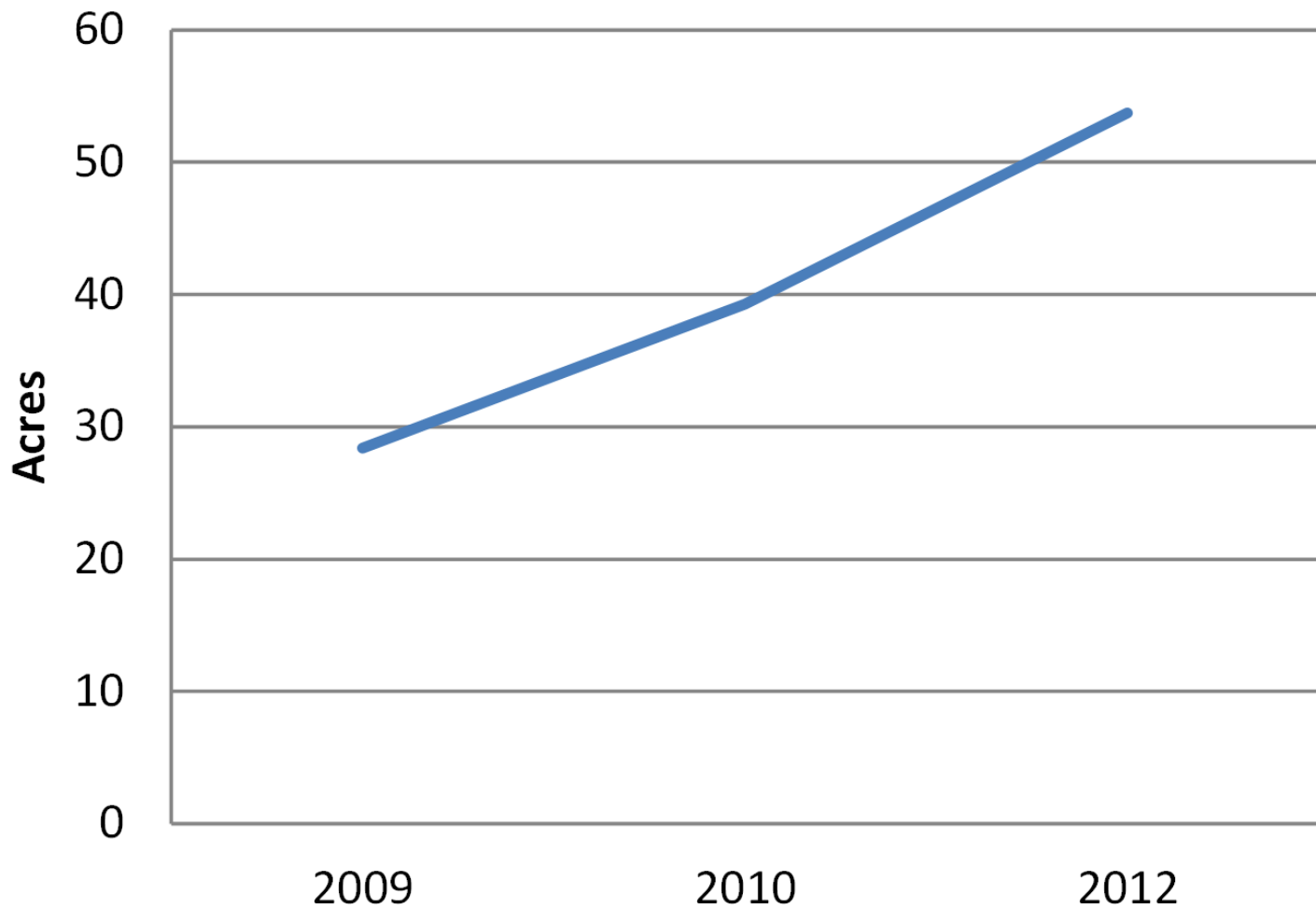
\* Water use estimates derived from HGAMedical Cannabis Ordinance 2010.

0 0.25 0.5 1 1.5 2



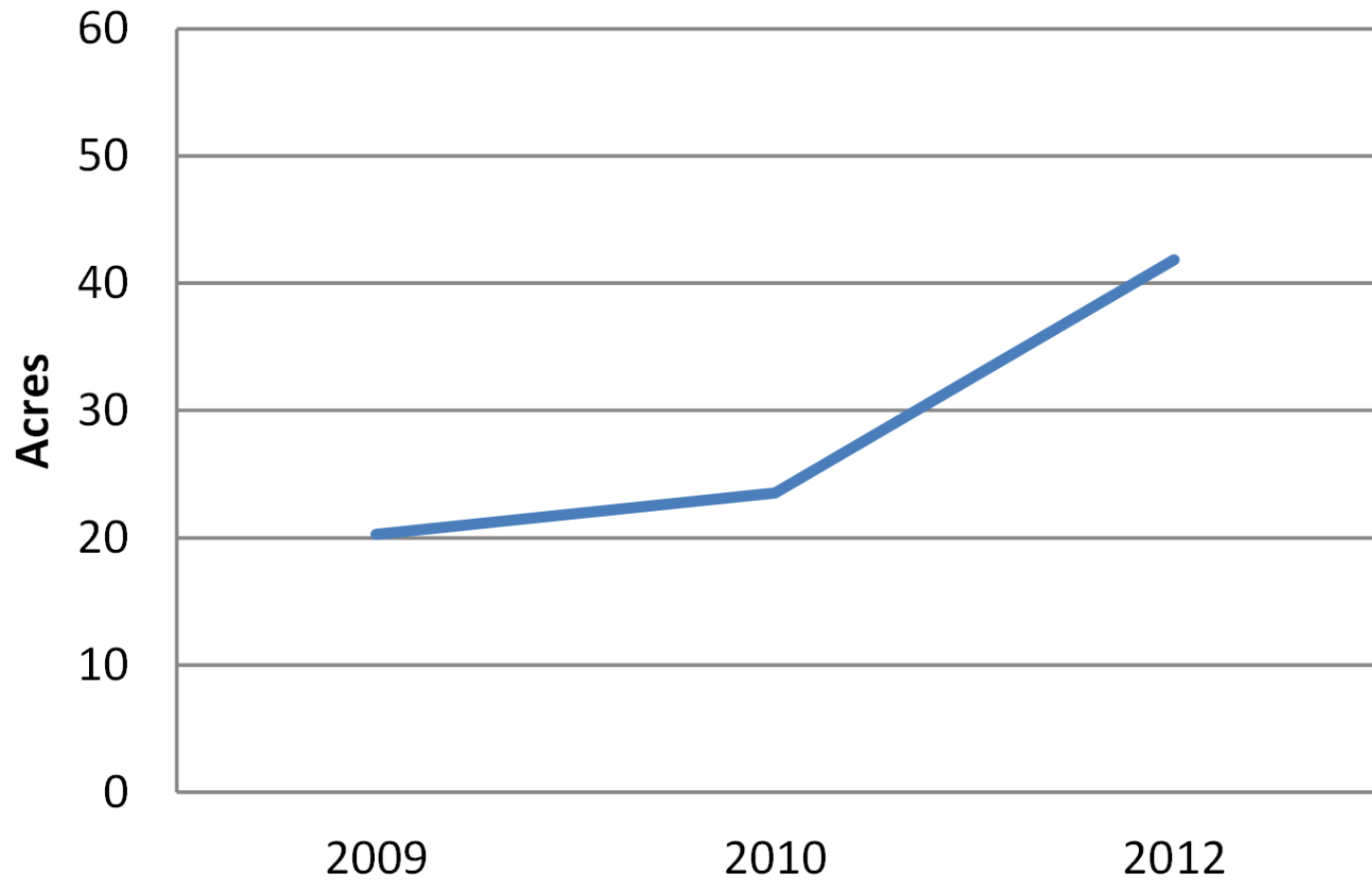


# Redwood Creek





# Salmon Creek





# Conclusions

- Total estimated number of grows/watershed (indoor and greenhouse) = 550
- Estimated number of plants/watershed = 19,000
- Estimated volume of stream flow consumed by plants during summer low flow (dry year) = 20-30%
- Number and size of grows increasing
- **This study indicates marijuana cultivation in the two study watersheds has significant negative effects on watershed health and sensitive aquatic species.**



# Unanswered Questions Remain...



- What happens if everyone switches on their pumps simultaneously?
- Where are people primarily diverting water?
- How has water quality changed during first fall flow event and throughout year?



# What we're seeing today...





# Diversions





# Ponds





# Fish Kills





# Massive Scale Grows





# From the Ground





# **Impact reduction strategy**

- **Department of Fish and Wildlife**
  - **Need financial resources**
  - **Need statewide multi-agency taskforce**
  - **Focus outreach re: education and permitting**
  - **Continue enforcement efforts**
  - **Work with all stakeholders**





# Van Duzen River

08/29/2012





A man in a tan uniform with patches on the sleeves is standing in a river, holding a large rainbow trout. The fish is held horizontally, with its head to the right and mouth open. The background shows a riverbank with trees and bushes under an overcast sky.

**Thank you!**

Questions?

Scott Bauer, DFW Coho Recovery

(707) 441-2011