



San Francisco Bay *Spartina* Control Field Operations Meeting

2005 Treatment Season summaries, imazapyr application techniques,
environmental compliance, and Bay-wide treatment strategy

Tuesday, June 6, 2006

Belmont Sports Complex & Conference Center

Summary Meeting Notes

The following notes from the 2006 ISP Field Operations Meeting are a brief summary of techniques or equipment that the speakers shared from their experience that may be used by other ISP partners to refine their control strategies. In addition, Kim Patten shared his wealth of experience studying the control of invasive *Spartina* in Willapa Bay, and his very specific recommendations on techniques, timing and annual training will likely assist all *Spartina* treatment efforts in the coming years.

Kim Patten, Washington State University:

- The *Spartina* control project up in Willapa Bay, WA is now achieving 50-100% efficacy with imazapyr
- Most of the big monoculture meadows are significantly reduced, leaving lots of clean up for the foreseeable future
- Skips and misses are the main problem for ground-based applications (e.g. not hitting the back side of a clone, not getting out of the boat or Argo to access the whole clone, etc.)
- All Agencies in the Willapa project are currently using a mixture of imazapyr (5pt/100g) and glyphosate (2g/100g) [along with Competitor (1g/100g)] to serve as a brown down indicator since imazapyr is so slow to show impacts. This allows for re-treatment of missed areas, and they are currently conducting 3 passes/season. There may be some ISP sites where we have the ability to treat multiple times per season, and we could utilize the brown-down indicator to inform the subsequent applications.
- Willapa has far fewer timing constraints than the ISP partners, and have found that mid-June to mid-July is the optimal time for their treatment season. ISP partners are now able to treat the sites appropriate for aerial application by July 15, so this will probably increase our efficacy over 2005 work that was all done after September 7.
- As the summer progresses, Kim found that poor canopy is the major reason for reduced efficacy. Virgin stands are the easiest to control, whereas bent or otherwise damaged plants result in low efficacy.
- Kim recommended taking note of the canopy quality pre-treatment because he has found that variable often explains the efficacy that they end up with after treatment.
- By late August, Kim's studies show that the seed will be viable even after herbicide application
- New estimate on minimum required dry time for imazapyr is 4 hours, up from early label estimates of minimum 1-2 hours. Needs more time in our real world applications. Willapa has generated computer models to reconcile bathymetry/marsh elevation and minimum dry time to prioritize the treatment season.
- The guidance we had previously received that we only need to treat the top 18" of the plants has been variable in studies that Kim has done, but is still generally true.
- A key point was the need for annual training for applicators to try and achieve some consistency and limit wasted herbicide and money. They found some applicators were reaching rates of 1000 gallons per acre, equivalent to a tenfold increase over the target rate.

This adds up to many thousands of dollars wasted (see summary below from Cornish and Burgin (2005)), and John Smith of BASF later pointed out how high rates can sometimes REDUCE efficacy not improve it.

John Smith, BASF Corporation:

- When treating re-growth from the mature plants (vegetative growth from the rhizome) it is important to allow the plants to get healthy before the herbicide application. Weak or unhealthy plants are difficult to kill (the plant just shuts down and little translocation occurs).
- Seedlings won't flower and go to seed in Year 1, but usually in Year 2.
- Methylated Seed Oils (such as one of our leading surfactants, Competitor) should work well for *Spartina* control at low application volumes (< 30 gpa). **But @ high volumes (30-100 gpa) we are getting no benefit from the oils** because the volume of liquid is just washing the product off the plant. This provides another reason to apply at low volume, along with the other label recommendations advising against the need for "spray to wet".
- John reiterated a number of Kim Patten's points, including the call for annual training for *Spartina* herbicide applicators, and offered his assistance for this purpose.

Mike Forbert, West Coast Wildlands, Inc.:

- Applied at 25 gpa (up to 35 gpa with tall *Spartina alterniflora*) which follows the label recommendations for Habitat to apply in a "gentle rain" as opposed to the method with glyphosate of spraying to wet.
- Used 6 foot wands with cone/jet nozzles
- They start treatment in the early morning on an outgoing tide (even if that means they are out to the site at 4am). Because the tide is receding, they start at the upland edge and work down to the lower elevation areas.
- They spray plants from the periphery/edge towards the center of the clone.
- They use shields or 5 gallon buckets to protect native vegetation, and they flag buffer zones around no-spray areas
- Mike's crews completely drain the spray wand down before leaving the treatment area to avoid off-target damage from drips or accidental spray.
- Mike emphasized advance planning for the applications: plan the tidal chart 1 month before application, review all access points to assess necessary equipment, phone all contacts prior to and on the day of treatment
- It is good to have pressurized water on site to clean equipment
- On searching out scattered *Spartina* patches in the marsh: stop every few minutes and turn around to look behind you, and walk along all the channels if possible to search for outliers.

James Counts, San Mateo County Mosquito Abatement District:

- Encouraging the restoration of tidal flow to lessen the area colonized by mosquito larvae is a primary concern for this partner
- Used a higher rate of 32oz for marker dye (Blazon) for a longer lasting indication of where they had treated
- They clean the tanks every day so filters don't get clogged with sediment, etc.
- They used a nurse rig trailer behind their Argo (100 gal last year but increasing to 300 gal this year) to help limit the number of trips across the marsh and damage to Endangered salt marsh harvest mouse habitat
- Even their experienced crews get Argo's stuck, so it is important to be prepared for it. They have 3200 lb winches on their Argo's and are usually running several at one time (5 this year), so there is always one available to pull another Argo out

- It is also common to lose the tracks on the Argos (2-3 flat tires and it will drop a track). Less of an issue on newer Argos.
- Important to clean the tules out of the axle of the Argo
- They are using a P1 motorcycle chain for the Argos that has a more rugged coating
- The Argo Avenger is much improved over previous models (bigger, better motor and steering, hard rubber tracks rather than plastic, better system for draining water)

Sandy Guldman, *Friends of Corte Madera Creek Watershed*:

- They have incorporated more digging and manual removal into their IPM strategy than any other ISP partner to this point
- Approx. 26 work days of digging, mostly by Marin Conservation Corps
- *Spartina densiflora* infestation reaches 2.6 miles up the 3.0 miles of tidal influence at Corte Madera Creek
- Only infestation of *Spartina anglica* in the Estuary at Creekside Park, and first site where a hybrid between *S. densiflora* and *S. foliosa* has been documented
- Friends of Corte Madera Creek coordination of the *Spartina* control effort is essential with the infestation involving 176 private properties
- About 1500 letters need to go out to landowners when they provide updates on the upcoming control work

Pete Alexander, *East Bay Regional Parks District*:

- EBRPD actually began *Spartina* control work in 1979-80
- Presented some cost comparisons (herbicide cost not included) showing helicopter work at \$247/acre and ground-based work with truck and backpack at \$640/acre
- 182 acres of *Spartina* control work in 2005, with 143 done aurally by helicopter
- Early season efficacy estimates of 80% were revised down to about 60% once the growing season was in full effect. This is consistent with other aerial sites that the ISP is monitoring.
- Treated some sites in 2005 at higher tides to protect native pickleweed, but *Spartina* along channel banks was not well controlled. Plans to retreat those low elevation areas at low tides this year to clean up.
- The initial indications are that the pickleweed tends to come right back after imazapyr treatment.

Lisa Porcella, *Santa Clara Valley Water District*:

- Flood control and water supply is the major concern for this partner.
- Santa Clara Valley Water District ran across a common problem: they planned to treat 2 acres in an area based on monitoring, but the expansion of the infestation raised the number to 3.3 acres (and the next year the 3.3 acres ended up being 5.9).
- Their total infestation area has increased by over 100% every year, even after treating with glyphosate
- They used imazapyr at between 1.25% and 3% with good efficacy
- They have planned for a 5 year window to control their *Spartina*
- They got a South Bay Salt Ponds breach location moved b/c *Spartina* was present at the location

Saul Ferdan, *Alameda County Public Works*:

- Flood control and efficient water movement is the major concern for this partner.
- When Saul began working for Alameda County Public Works in 2002, they were still applying glyphosate by hand by hauling hose from the levees down into the *Spartina*.

- Even when they began employing an Argo, the size of the infestation was overwhelming and the expansion was easily out-pacing the treatment efficacy.
- Alameda Flood Control Channel has been the site of several sets of test plots over the past few years in an attempt to better understand our tools and refine the treatment strategy. These include 2004 ISP ground application plots comparing glyphosate and imazapyr, 2004 Experimental Use Permit aerial trials with imazapyr, 2004 & 2005 UC Davis helicopter treatment plots, and 2005 ISP ground application plots looking at both imazapyr and glyphosate with numerous surfactants and specialized combinations such as brown-down indicator and chemical mowing.
- In 2005, AFCD incorporated Argo work to treat areas of the channel that were missed or not treated by the helicopter. The helicopter pilot provided detailed info as to what areas needed follow-up after his treatment.
- Efficacy estimates from April of 70-85% were optimistic, with more variability visible in June, and low elevation areas along the large channels showing vigorous regrowth

Tom McNabb, Clean Lakes, Inc.:

- MarshMog is a large amphibious tracked vehicle with only 0.61 psi of ground pressure. Its size allows it to carry a larger 50 gallon tank of herbicide (which limits repeat trips across the sensitive marsh to refill the tank) and delivers the spray with a GPS calibrated boom off the back of the vehicle
- Clean Lakes Inc. found 500 gal feeder tanks to be very useful in their *Spartina* control last year. These can be rented for a project, towed behind a truck, and left in a convenient area to refill spray equipment.

Summary of an article by Cornish and Burgin (2005)

As part of their study, they did two side experiments examining the variation in delivery between spray operators, and found significant differences in the amount of product applied, similar to the tenfold differences Kim mentioned from the Willapa *Spartina* control project.

The range was huge in both time it took applicators to spray a given area and how much product they applied, making it easy to see how this would add up to some costly over-applications for something like the Invasive *Spartina* Project.

In their 1st experiment, applicators treated a 20 X 0.5m strip (10m²). Application times ranged from 24.3 to 112.7 seconds, equivalent to 2.7 – 12.6 hours for them to complete one acre. They used the equivalent of 34.2 – 160 gallons/acre of tank mix, or 0.34 – 1.6 gallons of product per acre. For our expensive imazapyr herbicide the range would be \$92 – \$432 per acre.

The 2nd experiment showed even more alarming results. Using a smaller 1m² test area for the applications, treatment times ranged from 4.5 – 45 seconds, the equivalent of spending 5 – 50.6 hours on each acre. They used the equivalent of 21.4 – 684 gallons/acre of tank mix, or 0.21 – 6.84 gallons of product per acre. If this were imazapyr, the cost range would be \$57 - \$1847 per acre for the herbicide alone.

In addition to raising costs and spending too much time on a given site, there are other problems with this variation between applicators. As John Smith from BASF noted, over-applications can actually reduce efficacy by washing the product off the plants, which emphasizes the importance of getting the application rates right. This may be especially true when using surfactants made from oils.