

**Wildlife and Habitat Management Review  
Malheur National Wildlife Refuge  
June 1-5, 2009**

**NOTES FROM FIELD DISCUSSIONS**

Review Participants	2
<b><u>1. The Blitzen River –</u></b>	4
a) <u>Natural and Current Hydrologic Conditions</u>	4
b) <u>Restoration Work Already Conducted</u>	5
c) <u>Native Fish - Study on Redband Movements and Management Implications</u>	6
d) <u>Riparian Conditions and Management</u>	9
e) <u>Instream Habitat Functionality in the Lower River</u>	9
f) <u>Considerations for Restoration of the River</u>	10
<b><u>2. The Lakes – Ecology, Function, Role, and Management</u></b>	12
a) <u>Malheur Lake</u>	12
b) <u>Mud Lake</u>	13
c) <u>Double O Unit and Harney Lake</u>	16
<b><u>3. Meadow/Marsh/Wetland Complexes and Management</u></b>	17
a) <u>Meadow management</u>	17
b) <u>Finetuning habitat management to meet identified wildlife needs while operating within the constraints of plant community response and irrigation capability</u>	19
c) <u>Meadow management in relation to ponds and marshes</u>	23
d) <u>Ponds</u>	24
<b><u>4. Invasive Weeds</u></b>	26
<b><u>5. Krumbo Lake – History, Use and Management</u></b>	29
<b><u>6. Sagebrush-Steppe and Uplands Management</u></b>	31
a) <u>Managing natural sagebrush communities for diversity and habitat components for desired species</u>	31
b) <u>Use of crested wheatgrass in post-fire rehabilitation efforts</u>	33
<b><u>7. Grain Farming</u></b>	34
<b><u>8. Significance of Malheur Refuge for Certain Wildlife Species</u></b>	35
<b><u>9. Vision for the Refuge and Closing Thoughts from Various Days</u></b>	35

## Review Participants

---

---

<b>Last</b>	<b>First</b>	<b>Affiliation</b>
Anderson	Matt	Oregon Department of Fish and Wildlife
Bales	Brad	Oregon Department of Fish and Wildlife
Beck	Linda	Malheur National Wildlife Refuge
Bodeen	Tim	Malheur National Wildlife Refuge
Bortner	Brad	US Fish and Wildlife Service
Boyd	Chad	Agricultural Research Service
Crammond	Dar	US Fish and Wildlife Service
Damon	Jamie	Portland State University
Davies	Stacey	Harney County Community
Davies	Kirk	Agricultural Research Service
Dobkin	David	High Desert Ecological Research Institute
Engler	Joe	US Fish and Wildlife Service
Goss	Carey	Malheur National Wildlife Refuge
Green	Mike	US Fish and Wildlife Service
Gregg	Mike	US Fish and Wildlife Service
Hellbusch	Terri	Malheur National Wildlife Refuge
Ivey	Gary	International Crane Foundation
Johnson	Dustin	Harney County Extension-Oregon State
Karges	Chad	Malheur National Wildlife Refuge
Kesling	Jason	Burns Paiute Tribe
Kilbride	Kevin	US Fish and Wildlife Service
Klus	Rod	Oregon Department of Fish and Wildlife
Lohr	Sam	US Fish and Wildlife Service
Marshall	Gary	Harney Co Community
Mauser	Dave	US Fish and Wildlife Service
Mayer	Tim	US Fish and Wildlife Service

---

---

<b>Last</b>	<b>First</b>	<b>Affiliation</b>
Morris	Danny	Malheur National Wildlife Refuge
Nichols	Dan	Harney Co Community
O'Dell	Turner	Portland State University
Obradovich	Matt	Bureau of Land Management
Peyton	Bob	US Fish and Wildlife Service
Renc	Andy	US Fish and Wildlife Service
Sallinger	Bob	Portland Audubon Society
Selvaggio	Sharon	US Fish and Wildlife Service
Shannon	Mike	Ducks Unlimited
St. Louis	Marty	Oregon Department of Fish and Wildlife
Stockenberg	Erin	US Fish and Wildlife Service
Svejcar	Tony	Agricultural Research Service
Taylor	Bruce	Defenders of Wildlife
Theall	Shane	Malheur National Wildlife Refuge
Thomas	Sue	US Fish and Wildlife Service
Vetter	Rick	US Forest Service
Walters	Tim	Oregon Department of Fish and Wildlife
Wenick	Jess	Malheur National Wildlife Refuge

# 1. THE BLITZEN RIVER

## a) Natural and Current Hydrologic Conditions

Discussion from

- **June 2, 2009 Stop 4. Page Springs Campground**
- **June 4, 2009. Sodhouse Dam (partial) – also see Fisheries**

*Background:* Seventeen to 20 miles of channelization from Page Springs. Several gauging stations track regulated flow on the refuge, variable month to month and year to year. USGS gauge upstream of Page Springs Dam has continuous data since 1938 and is not affected by diversions or regulation. Data from this gauge has no long term trends indicating climate change.

There are approximately 40-50 diversion structures off the river and a total of maybe 100 in the Blitzen system to provide irrigation water to various ponds and meadows. The objective in the Blitzen Valley is partially to make up for the fact that Malheur Lake is not functioning as it did historically. Five major diversions on river are currently unscreened and two on East Canal. Highline and West Canal are screened. The cost to screen is about \$5-7 million. The stimulus money will cover \$2.9 million of this.

There is a handshake agreement with ODFW to keep 20-25 cfs in the Blitzen River in summer. During the winter months there is a target of approx. 45 cfs mandated in our winter water right permit for the Blitzen mainstem, and 5-10 cfs at the mouths of McCoy, Mud, and Bridge creeks. When we applied for a permit to divert water October 1-March 1 for refuge management purposes (7-8 subuses are included in this), we agreed to study redband trout and do an instream flow study (to set geomorphic high flow target and minimum insteam flow – for redbands). We are collecting the instream flow data at 33 cross sections of the Blitzen River. Changing water rights structure from irrigation to wildlife management gives us flexibility for riparian restoration – so would be less likely to see forfeiture if we stopped irrigating some meadows. The season of use and priority stays the same. Must collect data at low flow (~25 cfs), 70-80 cfs, 150 CFS and some at 400 CFS. Approx 4500 data points to grab. USGS is contracted to do high flow and they are now done with data collection. Data collection will be complete this year and modeling with be done by the State in spring.

*Presettlement condition and future conditions*

- What is the presettlement condition of Blitzen River? Probably more uplands, sloughs, braided channels, beaver. Probably not prolonged wetland conditions over most of the valley, however there were some large permanent “swamps;”
- Why wouldn’t it been bank to bank? Channelization of the river and some leveling occurred by settlers prior to refuge establishment. Wagon trains could only get across the valley near Rattlesnake Butte at the Rocky Ford Crossing.
- The system is engineered for a snowpack driven system – water supply may become an issue if warming causes more winter precipitation to fall as rain instead of snow.

### *Minimum Flow and the Potential Impact of Climate Change*

- Has the Blitzen ever been dewatered? No
- How does 20-25 cfs compare with what's being diverted? Will the same minimum flow constraints apply in CCP? Each canal determines its capacity. Example West Canal can hold about 40 cfs tops, then shuts off in July. We also maintain 5-15 cfs in East Canal for fisheries. Sometimes that's all that's available.
- Minimum flows are most likely going to be adaptive – as we learn more about Redbands and do restoration, minimum flows and their timing could change. (In July, there can be as little as 40 cfs or less at Page Sprs Dam – this has to satisfy diversions and instream flows. By Aug or Sept, there's even lower flows in the river but by then, the irrigation diversions are done for the season)
- I don't know if our irrigation will worsen if snowfall decreases. Could potentially extend the season.
- Trends have not yet been seen in base flows of the Blitzen– it's a higher elevation system and not as sensitive yet to changing temperatures.
- Base flow in August and September is pretty stable here.

### *Conflict of Diversion Needs with Riparian Values*

- Riparian vegetation takes root along diversion structures but eventually causes water delivery issues. The root masses attract beavers who then create smaller dams. This “unauthorized” activity can overflow roads.
- Past refuge policy was to maintain canals and roads by removing woody riparian vegetation, when necessary, but generally to maintain such habitat along the other side of canals.
- Diversion from the Blitzen reduces water levels and flood peaks, which may negatively affect riparian zones. Conversely, along laterals into which water is diverted, too much riparian growth affects conveyance efficiency.

### *Water Rights*

- Two settlement agreements govern water rights and also touch on water quality, fish passage and screening. The agreements are with Oregon Water Resources Department, ODFW and Water Watch Oregon. They've been inserted into the winter water right permit and are legally binding.
- Hope the Service can keep an open mind on water rights.
- We don't want to chase numbers on paper – we will continue to manage the existing valid water rights throughout the Oregon state administrative process to ensure that best possible water supply for all refuge purposes.
- Really about 2 issues: location and timing. There are constraints on time and amount of water. Water rights are not a major impediment for management. The problem is water availability. The Refuge has legal rights to divert water in winter if within State law and guidelines.

## **b) Blitzen River Restoration Work Already Conducted**

With Discussion from

- **Tuesday June 2 - P Ranch Stop**

*Background:* Restoration goal along 3 miles of the river here was to increase elevation in stream and dissipate water energy in high flow events. The refuge built weirs, armored banks with root wads. The project creates downstream scouring which results in 10-20 foot holes which hold desirable deeper cooler water. We have seen new gravels above weirs but no rooted aquatic plant community yet. Since the restoration the refuge has seen all age classes of redband at this site plus other native fishes. Poles/whips of willow were planted but failed. Bird diversity increased with rehabilitation project – monitoring was done by Pt. Reyes Bird Observatory.

*Discussion*

- What is the middle channel stream elevation? Don't know.
- Are there more opportunities to do more projects? Yes, but we need to figure out how we want to manage the river.
- If you had to prioritize stream restoration strategies, focus on restoring processes first, then instream structures.
- Problem with weirs is that there is limited gravel substrate – Page Springs Dam, and to a lesser extent, the Columbus weir at the Page gage on BLM are capturing source gravels.

## **c) Redband Trout (and other Fish): Study on Redband Movements in and Management Implications**

With Discussion from

- **Blitzen River Restoration stop Tuesday June 2**
- **Sodhouse Dam stop Thursday June 4 (partial – see also Hydrology)**
- **Riparian at Krumbo crossing (partial) Thursday June 4 – also see Blitzen River Potential Future Condition and Vision**

*Background:* Study involved pit tagging of 650 redband and radio telemetry of 100 redband. Telemetry allowed tracking in tribs whereas data on movements of pit-tagged fish could only be collected as they moved past dam structures on mainstem. We also collected water temperature.

In winter redband are broadly distributed up and down the river. One population stays in the Steens. March through July they move upstream. The data suggests that fish are migrating not just to spawn but also for habitat selection for cooler microsites. There are many of these near Page Springs. In October to November redband move back downstream for winter habitat. Spawning occurs mostly in the mainstem. Little Blitzen? is the only tributary where they successfully spawned.

Blitzen River is a unique system. There are bridge lip suckers, coarse scale suckers, chisel mouths, northern pike minnows, reddsided shiners, mountain whitefish, longnose and speckled dace and the Malheur mottled sculpin as native species. In 1853 Bendire observed suckers spawning at Sodhouse Springs. Few natives were found in Matt's study. Some whitefish and bridge lip suckers were found as far down as Busse Dam in March. About June we got fish in Page Springs trap. Native fish focus on micro cold sites. Story about providing cold water via a garden hose into stream – fish instantly showed up.

#### *Passage Issues*

- Passage is hindering migration of these species at some of the dams. Passage only took hours at Page Springs but Busse Dam had a mean passage of 25 days. About 40% were never able to pass this dam. Grain Camp dam passage took 3 days. The big problem is the fish finding and entering the ladders. The denil ladders are particularly difficult for fish to pass.
- Because passage has a large impact, it should be a priority issue to deal with.
- Most fish do not jump. State is excited about stimulus funds due to fish passage and screening money. The dams delay passage. The new ladders will be designed to pass all native species.
- Denil ladder stop the carp movement.
- Grain Camp has a side ladder unlike all the other except Page springs. It is a pool ladder, but it is not ideal for all native fishes to pass.

#### *Temperature and other Water Quality Issues*

- The lower part of the river gets to almost 80 F (28 C). At that temperature, redband can still feed but at 29 C, they die.
- Water quality: not much nutrient problems; DO and temp are the primary problems. Turbidity at high flows and draining wetlands also decreases water quality.
- What is the TMDL and is it a west side driver? The stream is impaired due to high temps, however thermal standards have been changed for redbands. This river will still be classified as impaired even based on the new standards.
- Temperature studies showed that most of the warming occurs in the sinuous stretch near the upstream end of the refuge before most of the return flow hits the river. Since this is upstream of most of the return flows from irrigation, the warming does not appear to be caused by return flows. The warming is probably due to a combination of low flows, low gradients, and lack of riparian habitat.
- Right now, water drains from each pond directly into the river. Consider replumbing so that water is marched down the irrigation system rather than being dumped back into the river. This may limit additional warming contributed by the irrigation water.
- The problem with this strategy is that you give up independent management of the ponds.
- Or consider putting in a layer of sand and gravel in ditched fields to create more of a subsurface flow back to the river. This would also cool the water.
- The problem with this strategy is you may increase the amount of water needed to maintain the wetlands.

- Subsurface flows simulate springs and decrease temperature. There is not a lot of seepage back into the river. If you run water through a wetland it will result in decreased nutrients.
- Does stream temperature in the lower river initiate redband movement? The higher the temperature, the more likely they are to move up. Redband don't move until the temperature gets above approx. 6 C.
- With data was able to see relationship between redband migration rates and flows, temperatures, and type of tag. Stream flow was significantly positively correlated with migration, as well as fish length
- There may be a conflict with late season irrigation and migration. Some fish are still in the lower river in July and there can be some serious temperature spikes. Also, carp have started moving upstream from lakes to wetlands to spawn at that time. Carp are moving at 15--18 degrees C.
- Sodhouse Dam has been closed in the past to prevent carp migrations.

#### *Entrainment / screening issues*

- Entrainment in ditches is another issue with redband.
- Carp can jump 4 ft. Has there been a priority set for screening the carp out? Yes, the state laid out the priorities in a letter to the refuge. Dunn Dam is OK. The upper basin is a high priority and we need to start upstream and work our way down.
- Are you going to be screening channels with decent habitat like Bridge Creek and East Canal? Consider how long flows last, duration of the water and water quality. Ditches are definitely a habitat sink.
- Ditch entrances on outside bends will entrain more juveniles than those on straight sections or inside bends.

#### *Other:*

- In the last 3 field season there has been very little utilization of Malheur lake by tagged redband. MA However, with higher water fish have been observed to utilize lake more. People caught redband at the Narrows during the flood.
- Is there a substantial population that stays above Page Springs? Genetic separation between Bridge Cr. Population and Lower Blitzen population.
- Redband staged at Sodhouse Dam to go up river
- The traps on the dams are closed through June and the carp are killed and red band released to go up stream. The mountain whitefish spawn in late fall. Other fish are spring spawners.
- Redband trout are opportunistic and take advantage of the different water flows. Are the native species restricted to just the River? No, but not a lot of monitoring in lake.
- 100+ carp in bridge creek traps with low flow and denil. Problem with denil structures is that attraction is hard to find due to ladder in middle, however new design will be from the side.

#### *Suggestions for Future:*

- Increase habitat on this end of the refuge where water is colder in summer. Lower end of Bridge Creek could be easily restored. Refuge may also want to rethink high

line canal management and other places on refuge for refugia for juvenile redband. Habitat restoration and passage is important issue for redband.

- Takeaway message is that instream flows are where the focus should be and especially when fish are moving upstream.
- Minimum flow per day is unpredictable because can't predict snowmelt. If year round it was about 40 CFS. If focus was fish, you'd leave it all.
- In temperature monitoring we notice that as soon as the river flows drop, the temperature increases – usually in July. Maybe that is the best time to cut off irrigation.
- Sodhouse ladders should run to the end of June – with some effort put into sorting fish. (if not you will sacrifice some variables of life history). After that, shut. Carp are never seen up at Page – habitat and stream gradient probably not good for them. Is colder water a barrier for carp?
- Would be good to do native fish surveys in lower river.
- Dropping the river temperature just a few degrees would provide a huge benefit. Long term issues are water quality and habitat.
- Start high for screening.
- Consider connectivity between inlets.
- For restoring connectivity in the watershed as a whole, consider model at Klamath where the refuge could trade off hay for work on private lands. Klamath Refuge prioritizes barley farming bids by those who trade conservation on their lands – “walking wetlands” for three years.

## d) Riparian Conditions and Management

Includes discussion from:

- **Thursday June 4, Stop 2 – Riparian at Krumbo Crossing:**

*Background:* The Blitzen was dredged in many places in the 30s prior to refuge establishment. Additionally, 17-20 miles are channelized. In places, it's deeply incised, with consolidated soils, and a stable channel. Recently staff has tried to re-establish riparian diversity by clump-planting shrubs up and down the system.

*Discussion:*

- Several spp. are important in bird conservation plans, including willow flycatcher, yellow warbler. May be opportunity to create more habitat for yellow-billed cuckoo, though hasn't bred locally for decades.
- Restoration would really benefit fish too. In the summer the current conditions are poor for fish.
- Do you see good riparian habitat in areas that are still sinuous? Not necessarily – many of these places are so deeply incised that riparian veg. cannot establish.
- Diverse riparian thickets on the refuge host willow, alder, and dogwood.
- Riparian with too much grazing assume ice cream cone shape - shoot for round shape.
- Willow spraying occurred under Scharff in attempt to maximize efficiency of

irrigation system. Mazonni changed this and Dan Taylor's work showed a significant increase in yellow warblers (riparian obligate) over a 10 year period.

## **e) Instream Habitat Functionality – Lower Blitzen River**

Includes discussion from

- **Thursday June 4, Wright Bridge stop near Malheur Field Station**

*Background:* Sinuosity is very high in this portion of the river, but the river is very incised with 10-15 foot banks and sagebrush on them. Refuge tried planting, but it didn't do well. Either floods or sizzles. There's a full pool approximately March 1-July 25. In this area there are a lot of old river channels that are all very deep. Fluvial lake deposits? Soil here is different – less clay, so river has the potential to change channels? Some of the old channels in this area are like this and are managed as ponds. It may be a natural phenomenon.

*Value for wildlife*

- Is this a priority area for the next 15 years? How much bird production? Not as many riparian songbirds and fewer cranes. Do get some ibis. Comparable number for some groups. Brood water is not as good here, not big water around except the lake.
- In this area we reach our target for irrigation almost every year whereas many other areas on the refuge we only reach the target in 6 or 7 years out of 10.
- So why would you priority dechannelizing the upper channel as compared to here?
- What kind of beaver control occurs? Before beaver are eliminated, they're transferred. We manage them because they plug up pipes.

*Value for trout?*

- Trout have less potential here in summer because of temperature. Spawning options not here for them. Stream generally warms going down except for something extraordinary like a spring. There may be a few we don't know about.
- A lot of redband do winter in the lower river – they like low energy deep lake like habitat. Protects from predators. Cover and complexity also hugely valuable in winter habitat. When water temperatures fall below 7 C (40 F) salmonids change behavior – seek deep pools or interstitial spaces in gravel.

*Suggestions from the group.*

- Create floodplain, 2ndary floodplain
- Get the hydrologic function first – the vegetation will follow.
- Have a geomorphologist evaluate.
- Riparian vegetation only slows the rate of warming – doesn't reverse it.
- If you had a full functioning hyporheic zone, you would substantially retard warming. Diminish flow here might obviate the need to reconnect to the floodplain here. Let upstream work guide the downstream work.
- Or use a full scale assessment to prioritize.
- Tossing structure in creates congregation areas but structure in a straight stretch can

cause erosion. If we raise the water table when dams are out, will improve riparian vegetation.

- We would get the most bang for the buck for cooling if we start at the top.

## **f) Considerations for Restoration of the River**

Includes discussion from:

- **Thursday June 4, Stop 2 – Riparian at Krumbo Crossing:**
  - Consult with Rosgen, a river restoration guru. May need to just restore parts, fill in existing channel or let it serve as a pond. Otherwise river will go to the lowest spot (current channel).
  - Look at historic aerial photos to for river restoration clues.
  - LIDAR may not work based on what we saw at Klamath. But it would help map channels.
  - Cost? Depending on how much nature could do for us, could be a big range. Snowpack and beavers in system will influence and can do much of the work. In places dikes have been rebuilt over and over again. May need to assist where there is deep entrenchment.
  - Best to start from the upper reach (south) and work to Krumbo Creek. Portions of the Bridge Creek sections you could restore easily with a dozer. There are different options as you come down the valley. Could prioritize restoration in habitats that are not otherwise functioning well for birds. Don't lose Benson Pond, writeoff Dredger, West Knox. Highline diversion comes off East Canal – put a weir below there? Make flow through the system – tie into Bridge Creek.
  - Lower end of Krumbo you could also return stuff below the dam to natural riparian as well as through the constriction are in the middle of the Blitzen Valley – let the highway and rimrocks be the edges. If you did this section, see where the river goes further downstream from there. High spots in the berm, make a few, make sure river can get back so fish don't get trapped.
  - Could keep west side for active hay meadows.
  - For road, would need to engineer bridges built for flood stage. Or you could give up one side of the road. Or let the river tell you where the road should be.
  - There is a possibility you could further raise temperature of the river as it would be shallower and more spread out. However, it would also have more riparian shading and the different surface to volume ratio will result in the river cutting, depositing, fashioning pools, etc. So may even out. In addition, you could have more bank storage in the floodplain which could lower temperatures. And, in a restoration, you'd want to intercept the cold water spots. Still, you probably won't be able to moderate the temperature between here and Page Springs Dam so that it's < 20 C all year.
  - River would probably be less subject to blowouts in flood years because the velocity would be slowed.
  - Water rights? If the river is managing the floodplain, don't need rights. Could cause a net reduction in irrigated acres which could cause the State to say refuge has

abandoned rights. We would dedicate back to instream flow. At Klamath there was a similar situation, they lost the rights altogether. Watermasters have different interpretations. “Ready willing and able” is the standard. Here it’s a little easier because there’s no real competition for the water.

- How much volume and velocity does it take to create a natural channel? Weather will dictate – for the Blitzen probably within 5 years if it’s all set up.
- There are two places on river where dike washed out upstream from here since Stanborough days. But it hasn’t dug a new channel, because most of the river is still in the ditch.
- Weeds?
- In the meantime, can continue to implement intermediate steps on portions of the river still in the natural channel like we saw at the Blitzen restoration site near P ranch the 1st day – can do anywhere we still have a natural channel, but don’t put weirs on a straight ditch.
- Consider spectrum of opportunities and implement the stuff with the best cost:benefit ratio.
- If the root of your problem is carp, then deal with them. If you deal with them, why bother irrigating the Blitzen Valley? Then functionality issues in the River would disappear plus Malheur Lake might function better if it’s not the recipient of all the warm irrigation water. Conduct modeling exercise – look at population structure.

## **THE LAKES – ECOLOGY, FUNCTION, ROLE, MANAGEMENT**

### **a) Malheur Lake**

Includes discussion from

- **Thursday June 4 – Post lunch stop at HQ Overlook**

*Background:* Malheur Lake fills from east to west. Has fluctuated from 0 acres in 1934 to 170,000 acres in 1986. A 1 foot gain in water level floods 10,000 additional acres. Deepest point right now is about 5’. There are a few isolated springs in the middle.

*Variable pH:* Where the Silvies and Blitzen rivers come in are the freshest part of Malheur Lake. The east side of Malheur Lake is more saline and hosts alkali bulrush, Baltic bulrush and spikerush. The west side is potholey. As the lake rises it goes west first and must rise high enough to cut through dunes to flood to Harney Lake.

*Fluctuations over time:* In 1992, the lake fell to 300 acres. This may happen on a 60-200 year cycle. (Double O doesn’t flood like this).

*Historical Significance:* Waterbirds, especially egrets, drove establishment of the refuge. At the mouth of the Silvies and Blitzen there were ibis colonies. Western grebes? Used to be

key staging area for canvasbacks as they left Alberta. Now the value is very low and it's changed the way birds migrate.

*What happened during the flood and subsequent drought:*

- Prior to the 1980s, emergent vegetation was taller. With several years of heavy precipitation, lost all emergents and carp exploded. Then lost the submerged aquatics. Then had 5 years of drought so vegetation couldn't re-establish.
- During the heavy precipitation following the drought, redband got back into the HQ pond, some think they tried to spawn.

*Carp:* There is basically no aquatic vegetation because of the carp which number in the millions and are in the lake and all its tribs. Rotenoned carp during the 1992 drought and killed 100,000 at that time but an estimated 25 fish left between the HQ pond and the lake shortly recolonized! Each female lays 500,000 eggs. Anecdotal evidence that carp have a negative impact to redband, which peaked during the 1930s, 40s and dropped after carp arrived.

*How to manage carp:*

- We've been fighting carp since the 1950s with no real success. Need an IPM approach. Need to manage continually, aggressively. Partner with ODFW – it's their fish – as well as Burns Paiute Tribe and Intermountain West Jt. Venture.
- Build an electrified barrier. This would work until floods over-ride.
- Hit with rotenone in low water years.
- But even when you have it dried out almost completely and think you've got them all, we've seen that carp will burrow into the mud. Need bio or genetics control.
- Initially, focus on Double 0 which doesn't flood like Malheur lake – could have more success.
- Control via structures at Sodhouse Dam. At any dam you can trap carp.
- In winter they like warm water. There is an opportunity to trap them where warm Sodhouse Spring water enters the Blitzen during winter. In Utah, they seined carp under ice.
- Use harvest / commercial tools? Is there any commercial interest. Yes, but they are labor intensive to harvest compared to other locations. Need to have sustainable tools. They have looked into turning carp into fertilizer but here the carp fertilizer has too much alkali unless the fish sit in fresh water for a while before harvest. CB
- Carp have a 10-year boom and bust cycle. Manage for the lower age classes. Smaller fish can be bird food.
- Feed a pellet which sterilizes them. Attract with chemoattractants.
- Sterilization has been used for Great Lakes sea lions – lessons learned include need to make sure there are not separate population components.
- There are no carp in the Klamath. Why? Did something biological happen there? All the other warmwater fish are there. There are a few goldfish in Lost River. Perhaps the giant redband in Klamath eat them?
- The 1960s master plan had a vision of individual management units in the lake for the purpose of managing carp. In 1980 Joe Mazzoni convened a panel, including Belrose and other wetland experts at Lee Frederickson's caliber. Their recommendation was

to not divide the lake with dikes. The east side of the lake is fairly saline, gets more shorebird use, the middle of the lake has bulrush and colonial nesting birds, the west side is a mosaic of potholes. If you put in dikes you mess with this. Dike maintenance is a nightmare with high water and ice can shear any kind of dike. Dikes would change the chemistry and movement of lake water. But if we don't find a solution, may want to revisit that decision.

- The carp barrier [at Mud Lake] may have already changed things. Does the Refuge have the time and the energy to do work out on the Lake?

## b) Mud Lake

Includes Discussion from

- **Friday June 5 – Malheur and Mud Lakes intersection**

*Mud Lake background:* Mud Lake fills after Malheur lake is full (at 60,000 acres?).

Historically, nesting canvasbacks used the bulrush marsh on Mud Lake. But no bulrush since at least the early 1980s. A lot of land swapping occurred over the last 20 years and Mud Lake is now mostly owned by the Service. Mud Lake was farmed and grazed for years while it was private.

*Carp management at Mud Lake:* Four years ago, FWS built the structure at Highway 205 to reclaim Mud Lake from carp when water rises. Currently Mud Lake has 800 acres and the objective is to keep large carp out if it. There are screens on culverts with half-inch spacing. This prevents breeders from moving in and buys time. Little carp can still move through. Daily wind-driven water goes through – a lot of water can stack up on one side or another. Since the project, we haven't seen a plant community response, but have anecdotally seen an increase in bird use.

*Other features of Harney/Mud Lakes:*

- We're speculating on the salt issue. Malheur Lake has the potential to produce sago / potomageton / widgeongrass in there. Sago is king for waterfowl use.
- Sago is present in fresher portions of the OO, though it's not real healthy in Ivey's memory. Widgeon grass was abundant in Harney Lake during the early 1990s and received heavy waterfowl use (>500,000 ducks).
- Dunes – archaeological interest. Rabbit bone piles, but we haven't studied the biology much. There are healthy natives there.
- What kind of bird use do we get on Harney Lake? There is not a management footprint there? Indirect management footprint from water entering from Silver Creek. Bird use variable – see flood discussion below.

*What happened during the flood years:*

- All the lakes mixed. Harney had fish. Tules were so high you could put plywood on them and camp.
- Salts from Harney Lake mixed and were redistributed throughout Mud and Malheur Lakes. Was the mixing enough to cause permanent change in marsh soils?

- Grad student studied vegetation re-establishment on Malheur Lake (see 1990s Refuge Narratives) – salt got pushed into the Malheur Lake system and it may not have the capacity to grow tules unless there's enough flood to flush the salts back to Harney Lake, may not get the veg re-established.
- Ice flows must have leveled topography in the 80s because it looked quite different then. About 50 years of more or less consistent water height prior to that caused wetland vegetation to build up. Then there were dramatic fluctuations. Were the 50 years unusual? Was the flood and drought a function of more erratic climate?
- On Harney Lake, about 300 snowy plovers were counted in 1980, but essentially abandoned the lake during the 1980s flood. In 1985, 27,000 common mergansers were counted there (Ivey). Fish eating bird numbers were very high during the early flood years. After carp died out of Harney Lake, because it became too salty, an extensive stand of wigeongrass grew in the lake and over 500,000 ducks including widgeons, gadwalls, redheads were counted there in the early 1990s. Then widgeongrass died out (presumably because of increased salinity). We then documented a huge population of tui chubs in the lake and a nesting colony of pelicans and terns was active on the lake. Tui chubs died out and brine shrimp showed up, along with many shovelers and ruddy ducks. In the meantime, Snowy Plovers returned and increased to about 2000 in 1998.
- Grebes eat tiny fish. Then pelicans started diminishing as carp got bigger. Problem with carp is that they get too big for pelicans to handle.

*Management discussion:*

- Objective should be to provide consistency for migratory birds as they are a trust resource. How do we balance river restoration goal but provide consistency – allow BV to complement.
- Providing consistency is hard to do with such a dynamic system – don't spend the energy that way.
- Should we plant trees to enhance nesting habitat?
- Waders – egrets – have we lost because the trees are down? I don't know if it's worth it.
- Most colonies were in the bulrush. More info at <http://www.jstor.org/stable/3536792>
- At Benson boat landing we did have large planted poplars which supported a colony. The flood eliminated 20 ranches - most of those sites supported tree-nesting waterbirds. All were destroyed by ice.
- A Western States waterbird survey is underway this year. We'll get a better idea of the importance of the lake shore at this level to curlews.
- Should we look to provide more stable pelican nesting sites? Better to spread species like terns and pelicans around, not concentrate on the Columbia River. Socioeconomic issue and endangered species issues with salmon there.
- Caspian tern study underway – researcher at OSU.
- Corps of Engineers came around a few years ago to explore possibility of islands for Caspian Terns. Klamath Basin will have three islands going in – cost of 3 million bucks. At Summer Lake it's a 1.5 million dollar project for 3 islands - half acre.
- Desert fish guys getting worked up about this – concerned that pelicans and

cormorants may end up on the island as well and eat sensitive/endangered fish species.

- In Warner Valley Crump Lake project finished last year - 135 nesting terns in 2008 plus more than 1000 gulls. Issues with Warner suckers. More info at: [http://www.eurekaalert.org/pub\\_releases/2008-06/osu-pst061608.php](http://www.eurekaalert.org/pub_releases/2008-06/osu-pst061608.php)
- Personally I don't think there's a predation risk from these birds to native fish – just a symptom of the other problems. Most birds can't eat the adults (pelicans can)
- If high water here, should we pull down the ponds to provide habitat for migratory shorebirds?
- Consider context. Remember when there's high water here (at intersection of Mud and Malheur Lakes) there's high water all over and all over the playas of the high desert. So it's spread out and not a critical issue that shorebirds would have no place to go.

#### *Water monitoring*

- Does water monitoring occur on the lakes? Salinity, clarity?
- No, but we should. It would be good if we had a continuous record of salinity in Harney Lake and also that we had tracked changes in plants and invertebrates with salinity, such as widgeongrass, brine shrimp to track how desert playas function.
- We do track the lake elevation unless there is no water at the Narrows (location of the gauge).

#### *Other*

- The bird diverters, balls and flutterers on the transmission lines along 205 work pretty well. Consider with new wind transmission lines – work with local utility companies. Not cheap though.
- There were more powerlines in the past – was a major source of death to cranes and swans. Move some lines near Tyler Brothers 40 acre piece to against highway. There are other lines around the refuge which should be moved, buried or marked to prevent bird deaths.

### **c) Double O Unit and Harney Lake**

With discussion from:

- **Doc Browns Friday June 5**
- In 1950's and 80's flood and passage between dunes occurred for the carp. When water receded carp headed into spring water. At the OO you can control water easier. The pond used to be very productive for birds. Simple devices can keep the carp out, but the structures need maintenance. Key to carp management is water management.
- Biggest issue at OO is carp. Carp use springs as winter habitat. Control water at Derrick Lake and build a drain to Derrick Lake. Let the carp go into the ponds and in the winter dry the ponds out. Also remove from springs and eradication could be possible.
- Treat OO in fall and dry out in the winter. Walk and make sure ditches are carp free.

It would take a big effort, but management is possible if no pool is missed. Carp control would help improve habitat.

- Strategy would be to figure out how deep the lake is and where carp are hanging out and drain lake in the fall. Refill 2 weeks later and shock. Put seine nets up to block fish and vegetation from going in to the lake.
- The frequency of draw downs should be every year. Won't the draw downs be an issue with the birds? It would be beneficial to the birds if the carp were controlled. There will be more ducks with carp control.
- The carp spawn at 68 degrees and the fish hatch 4 days after spawning. The carp are getting back in to former carp-free areas.
- Have you put a pipe in with high elevation? Yes, but we need the landowner to do maintenance. What is your experience with duck bills on the end of a pipe? They are really durable and when flow decreases they shut off.
- We may buy an acoustic Doppler for \$26,000 to \$27,000 which can do standard depth and make map of lake topography. This equipment would be very helpful. Sonar depth finder is also an option.
- OO unique system because it is immune to drought. This is treated as a separate unit from the Blitzen.
- North of Warbler Pond habitat is stressed. There is no water or a lot of water. The system is having a hard time to adjust. Silver Creek moved into high part of valley and spread.
- Tried planting willows, but they won't grow.
- Moon Reservoir never goes completely dry which could be an issue with the carp. No carp have been seen in Moon Reservoir. Carp are in Silver Springs, but they can't get over dam at Moon Res. We need a long stretch of drought for the carp to die, but in a wet year carp will spread all over again.
- The OO is a valuable area when it has water. Are there ways to get more reliable water? Yes, by water rights. I have experimented with different ways of getting water with pivots and now channeling. Silver Creek water can be used by the lower valley August 1 to March 1 each year. The oldest water rights are not being taken care of because lack of infrastructure. Refuge has 1880 senior water rights but these need to come across neighboring lands to get any of the water.
- The refuge has a good relationship with neighbors and Gary Marshall helps with water flow. Fifteen cfs water year round can be used for site management.
- During drought there is spring water to back-up into Stinking Lake playa. Bird use decreased with spring water because it changed the water chemistry of Stinking Lake. There should be more water control so the water doesn't go into this playa.
- Look at the two ponds we've been doing – it's day and night. The lower one has vegetation, dace, red-sided shiner, spotted frog, potamogedon.
- Utilize our resources – multispectral imagery .

### **3. MEADOW/MARSH/WETLAND COMPLEXES AND MANAGEMENT – ISSUES, STRATEGIES, CONCERNS**

#### **a) Meadow management – wildlife considerations**

With discussion from:

- **Wednesday June 3, Stop 1. Island Field**

*Background:* Discussion centered on meadow management strategies for striking right balance of native plants, timing of water to meet wildlife needs, and vegetation treatment possibilities. Questions centered on: Is there a meadow plant community that is best for wildlife species? What is the correct irrigation and treatment (treatment = grazing or mowing or haying or regime?)

At this site, there is a nice balance of emergents and grasses. The site itself is hayed but not grazed and flooded if a lot of water is available. The site itself also gets some subirrigation from the weir project in the river.

We do herbicide and water treatments during the growing season. We do haying, grazing and fire treatments during the dormant season only. Where grazing occurs, the dates cattle are allowed is from August 10-January 31. These dates are driven by bird fledgling and nesting needs. During cold winters the rake bunched grass is eaten quickly; during warm winters it's not which creates some dead spots in the meadows and causes some ditches to plug up. Permittes fund weed control.

Soils with restricted layer may have tendency to pond up but these are fairly rare on the refuge.

*Wildlife use on wet meadows:*

- There are 15,000 pairs of ducks in the Blitzen Valley but historically there were 100,000 mallards on Malheur Lake.
- Bobolinks key on clover, potentilla. They feed caterpillars on these to chicks. In 1984 began resting some fields. Bobolinks generally abandon a field if it is not treated (hayed, grazed, or burned).
- "Treated" fields allow earlier solar radiation to fields which stimulates earlier growth.
- Snipes, phalaropes also use short cover.
- Wet meadows are foraging habitat for ibis.
- Cranes nest in emergents as do redheads and rails. There are more soras on the refuge than coots.

*Timing of irrigation relative to bird nesting*

- Highest density of cranes in south end of refuge. Sixty percent of crane pairs use the south end of valley. Peak of nesting occurs in 2nd week of May. Early nesters initiate the last week of March. Won't nest until there's water in their territory. G. Ivey suspects early nesting birds do better due to the food resources.
- Based on advice from Frank Belrose, about 15 years ago, refuge began irrigating fields

earlier to allow earlier mallard nesting (nest by 3rd week of March but only if water available), whereas before, refuge had begun flooding last week of April. Seems to be better for mallards and cranes. About half the colts are fledged by the 1st of August – good to maintain some water till fledging – they shift to grasshoppers in late summer, while hatchlings are fed earthworms and small animals such as redwing blackbird chicks. Brood survival study data exists but not yet analyzed.

- Mallards and pintails fledge mid July.
- Gadwall reaches peak nesting about 5-10 June. They brood their young in open water. Fledge in September. Redheads same.
- Will ibis use if height is taller than them? Ibis are opportunistic, do well in wet years. When water's up they'll eat earthworms, when down, they'll eat aquatic insects. In 1998 there were 10,000 pairs nesting here, but they are very nomadic – could move to Great Salt Lake or Stillwater.
- Spotted frogs lay eggs as soon as ice melts. Should be OK with current water regime. Tend to hang around springs because need to overwinter in water. Present at Mud Creek Brood Pond and in the OO springs. Probably most of refuge meadows are too wet for spadefoot toads, but they are common in upland sites on the refuge. Only 1 tiger salamander sighting – at OO. Western toads are rare.
- Duck nesting data is available but needs to be analyzed.

#### *Function of emergents*

- Cranes nest in emergents as do redheads, rails. There are more soras on the refuge than coots.

#### *Predation*

- During Scharff years there was continuous predator control. Used strychnine, 1080. Nixon banned 1080 on refuge lands. Mazzonni eliminated predator control and in 1978 only 2 chicks fledged on the whole refuge. Littlefield documented coyotes getting 80% of the chicks. Refuge did predator control of coyotes 86-89 – resulted in 50 fledged chicks which was best that had occurred, so they extended the predator control plan another 5 years, but production never again increased. Found that mink population had exploded and they took out 40% of radio collared chicks. Striped skink also became more common and filled the niche. So, most years the refuge is probably a SINK for crane production. About 12,000 coyotes taken each year in Harney County with no apparent effect on coyote population numbers.
- Recommend keeping the tool but be cautious about using it for non T&E species.

### **b) Finetuning habitat management to meet identified wildlife needs while operating within the constraints of plant community response and irrigation capability**

With discussion from:

- **Wednesday June 3, Stop 1. Island Field**
- **Wednesday June 3, Buena Vista Overlook**

*Historical management:* focus was Canada goose production – they weren't abundant till the

70s. Mazzonni reduced grazing substantially and focused on cranes, swans, and nesting ducks. Initially, after the Blitzen Valley was purchased it was hard to get grazing to happen because of a depressed economy.

#### *Water depth and availability*

- No way to control depth exactly. Dikes and spillways set the level in good years.
- Because of lack of ability to control exactly, hard to transition areas from marsh to meadow.
- Do you know how much water it takes to do these treatments? How much gets taken out of the river and how much goes to the lake?
- We know our consumptive use annually and monthly. The inflow is about 95-145 thousand acre feet annually and we divert 55-75 thousand acre feet per year. So about 25-50 thousand acre feet per year goes to Malheur Lake.
- Water in the lake is generally wasted in terms of wildlife value as long as carp are in the lake.
- Is there a potential to model water availability for the future?
- Yes, we started to put together a model in 2000. Refuge uses now. Uses Steens snowpack as input variable. For the microlevel, choosing where to put the water – can use canal profiling. Can build a model, but we don't have a lot of controls here. So it limits choices.
- Is it possible to identify the high priority sites and figure out what's needed to get water there? The annual water management plans from the 1990s laid out water management priorities pretty well.
- If you took away infrastructure, could you model what you'd get?
- Yes, that would probably be simpler. Can evaluate this as an alternative.
- In a normal year, can get most of the Blitzen wet.
- Once we start losing diversity in wetlands, do we need temporal change?
- We don't even have an accurate GIS model of the canals on the ground. Need people who've been running the infrastructure to figure out how to get it where and when you want it. Similar problems at Kootenai.
- Rotation here is defined as a change in the duration of irrigation, not a complete lack of watering.
- How well documented is it, what you're doing, what works?
- Used to produce annual narratives – 1999 was the last one. We have a compatibility determination for commercial carp harvest – has historical information on carp management and bird production, treatment with rotenone. Treatment of weeds is not well documented.
- Could be a high priority to assess in the process. Compatibility Determinations control some of treatment.
- Now more marsh. It's a water regime issue. Water application has changed because now we start January 1 and irrigate till July 25.
- Why change of irrigation season? Because at the north end, we don't get enough water or anything at all in dry years. Cranes and mallards need water early to meet their needs.
- Also to get water to some ponds, need to run it through meadows. Thus succession

last 10 years. I don't see the same number of mallards as I used to see when I came here. Reed canary grass coming on strong.

*Wet meadow management practices by others:*

- On the OO, we have intermittent streams in a low elevation watershed, with wild flooding, some spreader dikes. We irrigate when the water comes, starting in January sometimes and usually finishing about now. The meadows are all native but do have some pepperweed. We haven't leveled the meadows there like here, so more diversity. We have old water rights but we don't have good diversions. If we hold the water longer, we do see plant community shifts. We've had some reed canary grass there in places that went away in dry years. Here you have more reliable water each year.
- At Roaring Springs Ranch, there's no problem with reed canarygrass. In areas where we target ducks, we're a little bolder and put in a control structure. Our irrigation and water rights windows are the same as yours. We emphasize late brood water as it is limited. There are no fish in the river there so not a management concern. To maintain fish habitat, before get overland flow, we make sure the flows are subsurface – to lower the water temperature. You may have places here where this can be done.
- Montane meadow at Logan Valley – we irrigate till June 1 and it goes into Timothy grass. Others run all year for grazing guy.
- At the Malheur River area we irrigate from April 1 – end of August. Can dry up any field – have good control. We haven't leveled fields. We did 200 acres of native grass, trying to get away from some. Soil types drain quickly.

*Plant community composition and structure:*

- Is this the plant community we want?
- Yes, it's healthy, just keep pepperweed cut.
- Voles helped maintain the thistles – pepperweed counted out?
- Stinging nettle is a weed but is the best nesting cover for ducks – coyotes stay away.
- How sensitive are our meadows to timing and duration of irrigation? Is it a gradient issue? Or is the management prescription driving it in one direction?
- In some places still have a component of native sedges, rushes, grasses. Other areas it's all creeping foxtail. Not sure why exactly.
- We're seeing emergent expansion into meadows. Years ago we had more meadow grass and sedges. Has there been a shift toward more emergents? No, it's remained mostly the same. The ponds on the dry side have changed of course, but where it's wet, it's about the same. Cannot comment on the BV area though.
- Andy has commented on several fields that have transitioned from grass to marsh.
- I think it's infrastructural.
- I think plant structure is more important than species composition. For nesting cover, a lot of species use exotics (except Timothy). When I was here we didn't swap the water back and forth. By not irrigating several thousand acres in the Blitzen Valley each year, you are impacting thousands of nesting birds. This is a serious issue that needs to be reconsidered.
- May want to experiment.

- Part of the issue is topography and infrastructure. Another part is drought and the decrease in water availability. Spreading so thin?
- What is the patch size we're aiming for? Are we aiming for landscape level diversity and it's OK if we have thousands of acres here of the same type?
- We're dealing with many issues, including weeds. Field Rx for wildlife is not conducive to weed control. Can't fix infrastructure when a field is actively irrigated, but we're still losing 200 acres/year to perennial pepperweed alone. The definition of insanity is doing the same thing over and over expecting a different result.
- But if we don't do anything, it'll become a monoculture of pepperweed.
- The context is that you're gearing the plant community towards nesting structure for birds. Fine, but this doesn't tell you about the quality for brood rearing. Species composition later has impacts on feeding success. Insects with native species are not found with non-natives. Bottom line is that you may increase nesting pairs but production is what matters. Ibises get up and leave. Cranes show abysmal fledging. There's not good production for most songbirds and probably not for waterfowl. Think about it from the systems level as the Improvement Act urges us to. In the system level it was the lake habitat, not the valley. The valley had willow. From a system-wide perspective in the west – we've lost native riparian woody and willow habitat – maybe 5% of what was there. Many high priority bird species use this. So from a system perspective – focus on more native woody riparian habitat. Might benefit from fire. Current management exacerbates invasives - #1 problem. Creating population sinks.
- ID focal species, fold in private land benefits. Put refuge in context – consider all other plans.
- A lot of the values provided in the Blitzen Valley were originally provided by Malheur Lake.
- Portions of the old river channel could be restored, could lead to more native plant response. My perspective is that you can do a lot of things in one place. I don't argue with what David said about productivity.
- We have tried to move the fire window to influence plant community, but we're mainly managing litter. A huge flux of noxious weeds follows each Rx burn.
- You could try winter burn – it may do less damage to the willows.
- How you apply the combination of treatments provides bigger options. Pepperweed grows late. You hay late. Does anyone come back to treat post-haying? Yes, we use herbicide post.
- Disking then chemicals then flooding helped with weeds at Kootenai. But there they had more water control.
- This side of the refuge looks better because the water is faster on and faster off.
- Tool of rest needs to be considered. Changes soil composition, humus, soil biology, possibly resiliency of the site to invasives. Let stand periodically. Next year do late season grazing. Has contributed to the ability of the soil to hold water better.
- What's ditch loss on east side vs. west side? Subs into fields – supports meadow. Are we accumulating peat? If so, bottom comes up and the dikes are functionally lower. More in the marsh than in the meadow.

- What works to knock it back is turning it into a pond. In general need 18-30” of water and then need to hold it at this level long enough. But it’s expensive to put in this capability.
- Our experience is that reed canarygrass thrives in lower spots where water is retained longer. It also showed up in wetter years in some places we hadn’t seen before. It’s rhizomatous and hangs out and can survive dry years.
- In the Midwest we did slow backfire into reedcanary grass duff – then flood. Would last 2-3 seasons.
- If we did that here, would need to dry out a lot of the refuge – and how much could we dry?
- Can shut off river from 5 mile – a quarter of this end of the valley.
- This end you would basically do corridors at a time.
- But if drying up too much – not good. It’s a two year operation to have everything dry. Want to do this on a unit by unit basis if you can.
- Could write into the plan that if you have a dry year, you’d do the treatments?

### c) The bigger picture – meadow management in relation to ponds and marshes

With Discussion from:

- **June 2, Stop 6 – Buena Vista Overlook – Meadows, Wetlands, and Ponds**

*Background:* There are many challenges related to managing water movement throughout the refuge and maintaining appropriate hydrology in meadows, marshes, ponds, and other wetlands.

#### *Control Capacities*

- Refuge managers have to flood BV and adjacent ponds just to get northern meadows wet.
- Limited control structures frequently require flooding through one (or more) meadows to get water to the desired area
- Similarly it is difficult to dry out the meadows south of these ponds without impacting pond water levels. (These ponds have *national* attention.)
- These inefficiencies combine with the large size of management units to create many water management challenges throughout the refuge.
- Is water available in the fall to provide for the migratory habitat? Yes. Doesn’t deplete river flows for the redband trout? Not a lot because we’re not irrigating meadows at that time.

#### *Questions and Ideas*

- Would more control structures help? Answer: Maybe, but there are issues with friction in the canals (cattails etc.) Past efforts to mechanically clear canals were problematic because they deepened the channels, requiring more water to flood fields. Recent clearing with herbicide has been better.

- What happens when you can't get water to where you need it? Answer: Refuge tries to make these decisions up front. It can be stressful for some plant communities – but it can also do some good things for pond soils.
- There could be more use of gator pumps for targeted flooding, but this is resource intensive, especially with reductions in staff (seasonal staff too).
- Defining the points on the hydrologic continuum – meadow, marsh, wetland, pond. Important to be clear and consistent. Emergent vegetation is phragmites, cattail, bulrush, and burreed. Marsh is an emergent stand.
- There is a lot more meadows in past compared to marsh.
- Burreed is better for nesting than bulrush. Cattails are not as good, but provide nesting cover for bitterns and sora. Almost nothing nests in phragmites. Don't put a lot of focus on control of emergents. Focus on other invasives.
- For meadows, dabblers nest in it. All ducks feed in meadows and wetlands, feed somewhat in marsh. Worry about your big brood ponds? Large brood ponds are important as they enhance duck brood survival. My impression is that more large ponds are needed and some ponds should be enlarged, such as combining the 2 BV ponds and eliminating the center dike.
- Change in water management of running water to deep brood ponds had irrigation coming sooner, mallard numbers decreased and reed canary grass came on strong.
- A big issue of the refuge is plant community succession and water management.
- Isn't IMW joint venture recognizing brood importance? Duck breeding populations set state for hunting season.
- Malheur has breeding habitat and brood water. Molting priorities are an important component also. Therefore, BV system may need to be actively managed.
- Habitat can change a lot by timing and depth of water i.e. saturation and duration.
- Plants need oxygen. Water height effects the composition of plants. A long duration of flood equals a cattail site composition.
- I don't think that's necessarily true.
- Muskrat populations are down since the 1988 drought. They did open up cattail. The muskrat population has decreased throughout Oregon.

### c) Ponds

With Discussion from:

- **June 3, Stop 2 – Knox Ponds – Ponds**

*Background:* Ponds provide habitat for ducks and sandhill cranes. The refuge currently has an objective for supporting 3500 staging cranes. Ponds are focused on duck production and fall/winter food. The spring migration doesn't come much through the Blitzen Valley – it comes through Summer Lake and the Double-0 and across the north side of the lakes to the Silvies Floodplain. Ponds are managed for food production (aquatic/moist soil vegetation and invertebrates) as well as for emergent cover for nesting and broods. The target is 50:50 emergent to open water (hemi-marsh). There are 5 ponds that are periodically drawn down (typically every 3 to 4 years) to allow for moist soil management. (Moist soil management uses a combination of water level

control, periodic soil disturbance, and timed draw down and inundation to foster growth of native wetland species). Otherwise, ponds are filled in the fall and maintained through the following summer.

### *Management Approaches*

- What's the right proportion of emergents? What are we looking to gain from the emergent community? Answer: ideally a hemi-marsh with a 50:50 ratio. If there are too many tules and bulrush plants deplete soil oxygen and we lose aquatic insects. But the emergents provide nesting habitat for mallards and redheads. Also they provide molting habitat for mallards who nest in California – they come up here from California to molt. If the emergent stand is big enough you could get an ibis colony. So big stands do have their benefit. Diversity in the water depths is good too.
- How to control emergents? Answer: Use of herbicides is tempting/easy to control emergents, but you lose a lot of aquatic plants. Goal is to get more submerged aquatics. Drawdown and disking are probably better strategies – “setting the system back to zero.” The compacting of soils through this process is also helpful. Klamath has had good success with this approach. Burning the field before disking is also helpful when possible.
- Drawdown every 4<sup>th</sup> year is probably a good rule of thumb – but it would be even better to just monitor existing conditions and do it as productivity declines – a monitoring program would enable this approach.
- Timing of drawdown – June 1 is good. And if can flood moist soil in September – October you get a quicker invertebrate response.
- Rotation and connectivity among the various ponds is not an issue – the birds will find and move to the food easily.
- Should heavy moist soil management be a priority? Semi-permanent marshes get a bigger bang for the buck on an annual basis. Yes, they're more compatible with breeding birds.
- Pros and cons of planting grain vs. allowing moist soil plant growth during the drawdown periods. (Question: is grain the best use?) Grain would be good for cranes but fall grain production requires more effort (farming). Moist soil plants offer a better variety, better feeding in spring and requires less effort.

### *Other Questions/Ideas*

- Is botulism a problem? Answer: this is usually only an issue when flooding areas that have been dry for a long period (e.g., after the Malheur Lake flood). It has not generally been a problem in the Blitzen valley – only in one pond (Boca Lake).
- There's a long history of trumpeter swan restoration here. Knox Pond and Boca Lake are swan nesting sites. Refer to the flyway plan and try to increase distribution.
- What to do with 8-12K acres of reed canary grass ...?
- Idea: let the river have some of these areas back – allow seasonal flooding/rotation. Manage the other part as one big unit.
- Could design some things that are more functional with less management. The old river meanders could be a clue to choose. The area further north is more degraded because it's the last place to get water.

## 4. INVASIVE WEEDS

Includes discussion from

- **Wednesday June 3, Sodhouse Lane Stop**

*Background:* The Blitzen River Unit strategy for weeds is containment – which is a difficult goal to achieve. The system carries seeds through diversions. There are tens of thousands of acres infested w/ pepperweed. For invasives a lot of factors influence control. Aerial spraying is limited, because if we spray a ditch, we can't charge the ditch for a while. We need to strategize where we treat based on an assessment of a) socioeconomics b) funding and c) ecological situation. The Blitzen Valley invasive treatment currently costs about \$120,000/yr, involving treatments on 7,000-8,000 acres/year. Pepperweed is the biggest problem. We try to contain other species so they don't become big problems like pepperweed. We have also observed a pattern: spray pepperweed, Canada thistle comes in. Then get scotch thistle, then poison hemlock.

The OO unit is easier – pepperweed is moving into greasewood but it is not as prone there. We use a textbook strategy – follow the water system and team with neighbors. We meet each year. Still, 4 years into the program we're still spending money on the 1<sup>st</sup> field we treated.

Sheep research is being conducted on 2000 refuge acres to control pepperweed and is part of a study with ARS and OSU extension. Used exclosures to test if sheep are reducing seed production and causing mortality. The sheep “learned: to select the leaves of the pepperweed – after some browsing, they get moved to another area, then returned again. We don't need to fence, but it's very intensive, the herders don't speak English. So far, it has been successful for stated goals. Sheep will also eat olive.

### *Russian olives*

- Olives got spread by the floods in the 80s. Russian olive is 95% dead on visible stems after last fall's herbicide treatment. Not sure on abundance in the vegetation understory. We'll let sit for a couple of years then cut and burn. If we do the retreatment sooner, we could get resprout.
- Have you done a burn with Russian olive? No, but after burn sheep will eat russian olive leaves if put in field.

### *Pepperweed*

- Pepperweed seed bank longevity needs to be considered.
- If you burn, will it resprout? Yes it will.
- Have you tried grazing for a longer duration, but less intensive? It may be good for pepperweed control if sheep are less dense and allowed to graze all summer, especially if favoring pepperweed over grasses, spike rushes, etc. Do sheep go for pepperweed the following spring? Yes
- Is the sheep grazing work viable? Could the refuge charge fees? We are not charging the herders for grazing so far (research). The goat industry charges \$1/day/goat in

Hell's Canyon for weed control.

- What do you spray pepperweed with? Escort, telar and hidep. Telar is better w/ thistle.
- Is there a plant species that will compete with pepperweed? We developed a seed mix of grasses and forbs that were designed to crowd out pepperweed. The seed mix is adaptable from upland sites to native bottom sites. However, it was a bust – nothing grew except for sunflowers.
- Suggest Great Basin Seed out of Utah.
- Is there a local seed source? Ray Anderson is a local man who may harvest local seeds for the refuge.
- What is the local distribution of pepperweed? Most western states.
- Is there any known IPM strategy? Problem is that it's a plant species related to *Brassica* crop species so it's a 10-15 year process to find biocontrols that won't affect agricultural production of *Brassica*.
- We cut our private meadows each year in July and don't have a problem.
- If you put animals out a month or two later on the regrowth it also helps.
- This intensive management with herbicides is not working. Either it's in the seedbank or the flood irrigation introduces new seed. When we take off the native grasses it doesn't regrow very well. Canary and creeping foxtail will regrow more. We have also seen places where it has died out after growing strongly for 10-15 years. Same thing happened to me with no treatment!
- No treatment at all and we observed a die off at OO. I wonder about the lifecycle of pepperweed.
- Do they do equally well in all environments? The area when wet at the sodhouse stop was so thick with pepperweed that a 4 wheeler couldn't get through it. We see it even moving into the shrub-steppe. Perhaps it establishes during heavy spring precip.
- Water can kill pepperweed out. There are 2 strategies: too much water or too little water.
- Reed canary grass has little pepperweed.
- Is it the hydrologic regime that allows pepperweed to establish or the vigor of reedcanary grass? Where there is pepperweed, there is nothing else. Is pepperweed allelopathic? We have trouble finding root exudates. The concept of allelopathy has been oversold.
- Should we monitor for cost benefit ratio to manage figure out if there's a better way to address the problem? Is it better to find the big seed sources?
- Biggest seed source is along the river and ditch banks, and we can't spray there, except with a roundup equivalent and that just kills the top. Can you wick pepperweed? Can you stem inject it?
- Why do some acres go to a monoculture and others not?
- Grazing during growing season can be used as a tool to change plant composition from a monoculture.
- You can kill pepperweed with water. After you kill pepperweed cheat grass or quack grass will take its place. Used some goats to control pepperweed, but not with great results.
- If you maintain a wetland flooding regime, pepperweed will be replaced by wetland

plants.

*Other weeds*

- Is Russian knapweed the only knapweed? Yes.
- If I had a limited budget, I wouldn't control thistle. It acts as good nesting cover.

*Broader discussion*

- Need to have a broader discussion on invasives. Seek a bigger response. Use GIS capabilities to document treatments. Visually assess results.
- What is the biggest bang for our buck? How can we figure an effective IPM strategy?
- You should document treatments through GIS.
- TNC created the WHIMS database to use, which we have access to. For us it's more a matter of people power.
- Get volunteers to help?
- Refuge has no base budget for invasive species control. The CCP needs to create a priority of invasive species – tie it in with habitat objectives. The budget will be based on CCP in the future.
- Do the wetland acres have significant invasive issues? Yes, as a guess, 80% of 60,000 are invaded.
- Prioritize new infestations and new weeds as well as introductions in priority habitats.
- There is no proven method for invasive control. Live with it unless something radically changes. Go to a lower level of concern.
- Deal with carp. Differentiate between eradication and management. Pepperweed and reed canary grass are in management mode. Mass your concentration on new species that you have hope of eradicating. We spend \$1000/acre to eradicate new infestations, but not that amount once they're established.
- I largely agree.
- In disturbed sites (levees) we make the mistake of not putting in a desirable species to compete with the weeds after we spray. I see spray spray spray till we die.
- It's labor intensive to get plants established in droughty peat soils. Best I've seen is basin wildrye. Look back in the narratives 50 years – same issues!
- A strategy for managing reed canary is to manage it as a short grass – provides value. Might extend grazing season in those areas. Pintails fill up on reed canary seed. But is it because of availability?
- A new slogan: “Malheur NWR – we've upped our standards. Now up yours!”
- Effectiveness monitoring is key. Look at scale down version of whole area. Keep field notes. Implement system to track treatments and results.

## 5. KRUMBO LAKE – HISTORY, USE, AND MANAGEMENT

With discussion from

- **Krumbo Lake stop, Thursday June 4**

*History:* Dam was built in 1958. Water use meets irrigation needs. No minimum use issue. Fishing occurs mid April-October 31; closure during winter is to avoid disturbance to wintering waterfowl (swans and divers). 3000 visitors/year, most popular in April/May and fall.

Fished species include large-mouth bass (self-sustaining) and rainbow trout (stocked). Can't maintain fishing without stocking even though there is natural spawning. Stocked with 12,000 8-10" sterile triploid rainbow trout per year (sterile stocking initiated in 2006); they grow 5-8 inches in a year. Stocking history available.

Dry Krumbo Dam blew out in '79 which damaged the dam here.

Native tui chub in basin – was disrupting fishery. The lake was extensively rotenoned in 1984. No tui chub have been observed in last 6 years.

Few redband; redband were stocked in 1985-86 and 2000. The reservoir is connected to Blitzen where there is 70 - 80 miles of habitat for the redband trout. There are no known redband in Krumbo Creek above dam; though some may have survived the rotenone in the springs.

Genetic analysis from 90s show that rotenone treatments were successful; almost all trout now are coastal rainbow.

### *Dams/ Connectivity*

- What has been changed since the dam was put in? Production loss for native fish populations.
- What is the Blitzen connection? There are tributaries: 1 McCoy Creek is dammed and is a one way trip downstream for the fish. They cannot migrate upstream. 2. Kiger Dam provides no passage.
- Do you see an opportunity for working on passage issues with private land owners? Dams that need repair now needs fish screens which cost 25K each. Private land owners do everything we can for fish but who foots the bill. The State of Oregon will provide 60% for passage and screening to the landowner. Landowner contribution can be in kind/labor/equipment.
- When we irrigate from Krumbo Reservoir, hardly affects the lake level. Irrigation is a screw gate. Do you use this for late fall water? Water collection is overwinter and water use is until July.
- There is a higher proportion of water relative to... Can sustain more open water.
- What if reservoir didn't exist at all?
- Hit on the system is from evaporation - 4-5 ft. annually lost per acre x 250 acres here. This equals 12,000 acre feet of water that would be supplied to the mainstem. A spike

of water at run off when you didn't need it would occur. It is good to store the water.

#### *Hybridization and naturalization*

- Does hybridization occur? Yes. Historically stocked coastal rainbow in the mainstem of Blitzen as well, but environment not hospitable to them, so only a few hybrids on Mud, not much on Bridge Creek.
- Have there been surveys on the creeks to assess spawning?
- There would still be reproduction from past stocking efforts.
- No redd counts, but fish are breeding upstream.

#### *Other options for maintaining fishery but with native species only*

- What are options for moving from coastal rainbow to a redband fishery? There are challenges with rearing redband in hatcheries. It is stressful on the fish and it changes the wild fish. Hoping we can resolve conflict by keeping rainbow sterile and focusing efforts for redband on the rest of the system.
- Could try putting in local redband trapped in the Blitzen.
- This is a popular fishery and we must provide for the public. It is one of the big 6.
- The last healthy redband trout migration left in the basin is up the Blitzen.
- Dry Lake and Riddle Creek had juv. redbands and 20-30 inchers during the 1980s flood. This may be the purest source of redbands left.
- No records of stocking there.
- If we were considering redband establishment, do we have seasonal regs to prevent fishing during spring spawning? Mid to late May is the best movement and spawning of redbands in the Blitzen.
- Redo fisheries management plan from 1985
- What would it take to return the habitat for more redband trout? The reservoir would have to be drained and rotenoned. Politically impossible for ODFW. Where else in SE Oregon can you get 8 lb bass? Even if bass were killed bucket biologist would still stock them back into the reservoir.

#### *Effects of fishing*

- My family is the 5th generation on the ranch and allowed fishing. People complained about cattle effecting fishery. People came and caught 250 redband in a 1 mile stretch in a weekend. Fishing pressure has a huge impact on fisheries.
- We manage via limits - 2 fish limit/day. No bait, flies and artificial lures only. We don't want catch and release only on most areas though there is a seasonal November 1 to late May catch and release on the Blitzen for redbands.
- Are the current windows of fishing protecting wildlife appropriately?

#### *Wildlife use*

- During fishing what kind of bird use is happening? Not a lot.
- Where are the grebes? Bass eat all small prey (their young?) and the tui chub are gone. In Boca Lake we had 3000 grebe nests (mostly eared).
- Public disturbance at Krumbo probably is more of an issue than bass.

## 6. SAGEBRUSH-STEPPE AND UPLANDS MANAGEMENT

### a) Managing natural sagebrush communities for diversity and habitat components for desired species:

With discussion from:

- P Hill, June 2.

*Key message:* not all sagebrush can be managed the same. Important to look at site potential, influenced by soils, subspecies dominance, etc. Desirable condition with lots of perennial forbs sometimes occurs where shallow, rocky soils are and water doesn't drain away.

#### *Plant diversity*

- Wyoming big sagebrush and Mtn big sagebrush communities are different. Research found a 14 times higher density and cover (of perennial forbs?) in Mtn big sagebrush as compared to WY big sagebrush (after management?). Study tried to control for past management history.
- Management over time may have impacted seedbanks. Significant components of upland communities were impacted by aggressive grazing in past.
- If sites have cheatgrass, native seeds don't last very long.

#### *Influence of fire and grazing*

- Fire return interval in Wyoming type 50-100 years. When use Rx fire in this type, don't see big increase in species diversity or perennial forbs. Do see a big increase in annual forbs. The pattern is very different when we use Rx fire in Mtn. big sage. Brush beating treatment see the same pattern.
- At Hart Mtn, first few years after livestock removal we got substantial flushes of forbs and bunchgrasses in low sage. But cheatgrass came in later.
- North of Frenchglen, it burned in 1996 and took out 90% of the Wyoming big sage. this is the best use of refuge crested wheatgrass seedings and that the refuge should seek opportunities to trade grazing AUM for habitat restoration both on and off refuge.
- ODFW is interested in re-establishing it to benefit nesting upland birds and mule deer wintering range.

*Juniper management:* Stop 2 has a density of juniper at approximately 5-10% now overall.

Frenchglen is a federally designated community at risk for wildfire, so we received WUI funds to reduce fire risk, which we did by cutting juniper.

Some areas will be available for firewood cutting. Other areas we will dispose of juniper through winter burns, to try to prevent weed encroachment, followed with a native seed mix in the burn sites.

- Piling and burning creates a lot of heat in small places and may facilitate cheatgrass coming in. Not a good idea especially in habitats that have this much diversity,

because you'll just create pockets for invasion.

- Rick Miller's work indicates that at about 5-10% juniper cover, sagebrush begins to be affected, especially if the soil contains a restricted layer about 18-24" below the surface. When this occurs, the juniper roots run laterally and compete w/ sagebrush.
- Others disagreed with this level of cover causing negative effects to sagebrush – think it is higher.

#### *Bighorn sheep, mule deer, and sagegrouse*

- ODFW is in the 4<sup>th</sup> year of a bighorn sheep reintroduction effort in this area. Population target not defined, but approximately 100 sheep between here and NV border would be sufficient, if production held steady. Best habitat is at the Catlow Rim. FWS can assist by providing shrub component in the uplands.
- Split Hills is one of the major mule deer wintering areas. Deer rely on the sagebrush component for forage in winter. When get heavy snows down to the valley and they need to rely on the crested wheatgrass, it's not a good thing. From Frenchglen to Krumbo Lane is the last of the more intact winter range.
- Sage grouse have been seen in groups of 10-15 in recent years near East Canal Road and Central Patrol Road in the winter time; sometimes in fall. Sage grouse use hundreds of thousands of acres each year. Question asked – to what extent can refuge provide late season brood rearing habitat? Matt responded that they go down in July and use the wet meadow habitat. Question was asked – why has sharptail introduction not been a priority. Rod said biologists decided it wasn't good habitat since we don't have the shrub component to the extent we need.

#### *Discussion of the relative importance of placing a priority on shrub-steppe management*

- There was some group disagreement about whether the Service should place a priority on this management, given that the Refuge contains only about 5000 acres of shrub-steppe uplands. Several people felt that there are probably other refuges and public lands that are more logical for focusing this type of management. Others pointed out that even in some crested wheatgrass areas, sagebrush is coming back on its own, albeit more slowly than desired. Also in some transition areas between Mtn and WY big sage, it seems to come in on its own, though sagebrush establishment needs help in other areas. However, others pointed out that we have a unique opportunity to manage in a landscape way which will be more likely to provide us with long-term success at that scale. Furthermore, with wind power going in, climate change, and other long-term stresses, there may be need for enhanced efforts. BLM could potentially help by costsharing.

### **b) Use of Crested Wheatgrass in post-fire Rehabilitation Efforts**

#### **With discussion from:**

- **June 2, Stop 1 – Krumbo Road, Otter Pond Area Uplands**

#### *Background*

The normal post-fire/succession cycle in the sagebrush steppe areas would have grass savannah giving way to a diverse community of sage brush, native grasses and forbs, but

that cycle has been interrupted by invasive cheatgrass. Crested wheat was seeded in some areas on refuge following fires. It was easy to grow and made good forage. This was successful in preventing establishment of cheatgrass within seeded areas, but it has also hindered the recovery of native grasses and forbes. Questions: What plant community should the refuge strive to achieve in these areas?

*Wildlife Use:*

- There are few data (only a few studies) on wildlife use of crested wheat areas – but those few studies show little to no use by wildlife – especially for breeding. There is no food available here (it is a “biological desert” without native forbs). Native bunch grasses would have been better. These areas could become barriers.
- A small plot like this (300 Acres) is not problematic by itself, but a patchwork of these areas may result in habitat fragmentation and impact production.

*Restoration and Fire Management Efforts:*

- It may be a little easier to get forbs back on land dominated by crested wheat than on land dominated by cheatgrass. Native forbs are not fire tolerant and cheat grass favors fires
- There has been some research on methods to restore forbs (e.g., disking, herbicide, and seeding with a native mix). Early efforts were insufficient to knock back the crested wheatgrass. One older study showed good results after two years, but then the community crashed.
- Things could be worse – cheat and wheat are both better than medusa head.
- Green striping was tried as approach to break fires with only limited success
- Another approach is strategically placed area treatments (SPLATs) – e.g., establishing “islands” of sagebrush

*Future:*

- Perspective: are these areas a priority? It is great to do some research, but there are bigger problems elsewhere on the refuge. Not many priority bird species use these habitats. Wetland areas may be more important – it may be better to spend energy/resources there. This is 8,000 acres out of 187,000
- Priorities for this area might include
  - Do some research now
  - Be prepared for future opportunities (fires) to test new approaches
  - Use these areas as a grass bank (for grazing) in exchange for benefits outside the refuge. Some believe this is the best use of refuge crested wheatgrass seedings and that the refuge should seek opportunities to trade grazing AUM for habitat restoration both on and off refuge.

## 7. GRAIN FARMING

With Discussion from:

- **Sodhouse Field Stop - Large Grain Field about 70 acres.**
- It is hard to have sustainable grain crops. Wildlife needs are for fall carbohydrate availability like wheat, barley and rye. There has been marginal success with sunflower and pea.
- Is this the drive of fall management of cranes? 3500 cranes used to stage at Malheur in the fall. 190 bushels of grain were estimated to be needed to support the refuge crane use objective for fall food. Grain fields help with chick survival and grain source for local birds also. It is good to have multiple fields of grain to help maintain a healthy population. Winter geese also use these areas.
- What is the use of crane and waterfowl now? It is down to 300 birds.
- The refuge objective for crane use needs to be reconsidered in the CCP, recent fall crane use is much lower and it will not be easy to rebuild their tradition of stopping at Malheur.
- As agriculture as a whole a lot of land for grain production. No elevator is in Burns therefore, good for hay crop and cover. Historically, many of the level refuge fields were developed as grain fields to grow food during WWII.
- There is not a problem with connectivity and specificity because the birds will move from field to field.
- Grain Camp and headquarters would be a great location for wheat. What about the OO site? Grain wouldn't grow so well due to it being a harsh site.
- Having grain and providing habitat diversity is high priority for cranes and not so much for other species.
- What is the time of crane migration? Earlier and earlier arrival to CA in September and it used to be in late October to mid-November.
- You should look into grain hay option because it is good for the birds and you can do it experimentally. The big challenge is weed control. A deal could be made with the harvesting crew that they could keep a percentage of the bushels and leave the amount the birds will need. A negotiation can be made with the farmer about weeds because they want weed free grain. You may want to do grain experiment in already disturbed areas.
- As we discussed, I suggest that you avoid putting new grain fields in areas of native meadow plant communities, although grain farming can be a tool in rehabilitation of dense emergent areas.
- The lack of refuge activity is pressing the birds to neighboring private fields.
- The Klamath has been using the farmer as weed control for 5-6 yrs.
- Manpower for farming has been limited this year; this not normally so.

## **9. SIGNIFICANCE OF MALHEUR REFUGE FOR CERTAIN WILDLIFE SPECIES**

*What is the significance of Malheur to the flyway for key species?*

- Cranes: 235 pairs on refuge in early 70s and about 245 pairs on the refuge in the year 2000 with about 10,000 in flyway. Cranes are expanding their breeding range in California, Nevada, and Washington.
- If use the area importance concept, Malheur still ranks pretty high for cranes, long billed curlews, white-faced ibis, redband trout, trumpeter swans, etc.
- How important is production of mallards and redheads? Insignificant at the flyway scale.
- I don't think that's true for mallards.
- For migratory waterfowl and shorebirds, the area to the north of the refuge (including private lands) is important.
- Malheur, Mud and Harney lakes are more important to migrating shorebirds than the Silvies floodplain.
- Wetland values are still important at a landscape scale.
- Is there a fall and spring shorebird component at Malheur Lake? Yes, but it's not a priority because we can't manage the water levels. It qualifies as a Regional Western Shorebird Hemispheric Reserve because we get > 20,000 birds.
- Malheur shows significance for several riparian species – chats have world's highest density here, also willow flycatchers.

## **VISION OF THE REFUGE AND CLOSING THOUGHTS FROM VARIOUS DAYS**

*At several times during the proceeding the question was posed to the participants:*

What should we be managing for and what against? What vision? What are we striving for?

- It's a struggle because we haven't talked about the lake. If we write it off, it presents a whole different set of decisions for the Blitzen Valley.
- Even if the lake were in perfect condition, in my mind it wouldn't change that much what we do in the Blitzen Valley.
- My vision is restoring the natural meander of the river with accompanying miles of riparian habitat in the southern part of the refuge all the way through the canyon area. This would boost the target neotropical breeders, but perhaps more importantly create stopover habitat for migratory passerines breeding in Canada. Recent telemetry research has shown that the connectivity of the stopover sites really function importantly in productivity.
- Much of what we had been observing and discussing for management efforts in the Blitzen Valley seemed to be aimed at reshaping the valley into an unnatural

configuration (i.e., transforming fields and meadows through extensive water management). The types of habitats these extensive efforts were intended to provide were duplicative of habitats that were historically more readily available in the northern parts of the refuge (i.e., the lakes and surrounding habitats). It seems all this effort is taking place largely because the northern refuge habitats are significantly degraded by invasive species – primarily carp infestation. (The elephant in the room.) If the invasive issues were addressed in other parts of the refuge, perhaps there would be opportunities to then allow parts of the Blitzen valley to return to a more natural state.

- You won't be able to completely manipulate one site. Aim for diversity throughout.
- Try to maintain diversity as much as possible since we're not totally sure of exact habitat requirements for native species.
- In the water plans, need to plan for lots of dry years and prioritize areas for irrigation [based on wildlife use areas].
- Remember refuge purposes as well as agreements.
- Is diversity of avian species part of the vision? What exactly does that look like over space?
- Management has to be adaptive.
- Important to maintain resiliency (Conboy story). Thus, you can't let things go.
- My problem is a lack of biological information in this area to help with the vision.
- Focus on where we want to go in the future. Only look back a little in past. Diversity in plants plus toolbox. I like the vision of low inputs and flexible management goals. We should aim for a range of acceptable conditions and identify the least amount of input necessary to keep within the range. May be good for the lake.
- It makes more sense to have work with the variability in the system than to try to achieve static goals each year.
- My vision is to minimize the need for management operationally. Use flood pulses in the river to restore lower end over 15 years. Still maintain some control for crane nesting and brood ponds. Between Krumbo and Grain Camp you could doze the dikes it let it be the floodplain.
- The idea that a significant portion of the refuge doesn't function is unacceptable.
- Flyway has management plan for cranes – consider this and waterfowl benefits. If we go back to historic conditions, waterfowl value will drop. Unless we can deal effectively with carp.
- Consider the flyway perspective – recognize the breeding component as a high priority. I generally agree with most comments, except I disagree with the concept of passive management. Hunting regulations are based on a new harvest level – the number of ducks raised here set the seasons. Also consider molting habitat for California ducks.
- It's a new day with the larger concern for energy and climate. This space is part of a larger space. It's not just a refuge, it's a community thing. Consider time as well – where do we fit in the long term? What's the function of the refuge? My vision is that you have a meandering stream, deep pools, willows. While you create, you may sacrifice production but only for a while. You end up with low operational inputs, high production of wildlife, a functioning lake.

- Some of us don't have the biological background of the refuge to make a vision statement. More information is needed.
- Carp free and invasive controlled.
- Go beyond carp, all invasives.
- Build a coalition for the carp. Go beyond boundaries, consider Silvies River. I hired Linda partly for this purpose.
- The wetlands reserve enhancement program would be a good tool to use on the Silvies if we can. Build relationships and confidence with private land owners, ODFW, tribe, High Desert Partnership. Refuge should push for a private lands biologist. Healthy waterbirds should also be part of the vision.
- Create a grass bank.
- Migratory birds primarily water birds and their relationship to the natural system. National significance with the Steens.
- If we normalize portions of the river and create a hybrid system, we'll need better water control than we have now as well as the ability to identify priority fields.
- Consider why they channelized in the first place. Increased forage in the system and increased wetland acres. If you restore you may end up with half rabbitbush and half swamp. Don't forget the importance of economic sustainability. The refuge is not wrong to have production that brings in cash. Look at bigger wholes. Public land should be a contributor to the economy, not just a vacuum. Not a big Scharff-style ranch but for sustainable operations. Forage off this refuge is critical to many ranchers. My vision for the refuge would have it be part of the community
- I amend my vision to include that.
- Amount of mud in the river is out of line. Reason is the juniper expansion in uplands. Keep a watershed perspective – it benefits the refuge to do work in the uplands to clean the water.
- Also consider the opportunity for conducting research with the restoration.
- My vision is that Malheur NWR will be managed and operated in a fashion to ensure the integrity of a natural functioning system. This will encompass all factors within or outside Refuge boundaries that impact the system. I see this system roughly described as the naturally functioning watershed for Malheur and Harney Lakes. The area can be defined as approximately from the upper end of the Silver Creek drainage near Big Mowich Mountain down to Riley and then into Harney and Mud Lakes; the upper end of Silvies River near Sugarloaf Mountain down to Burns and then to Malheur Lake; the Malheur Slough drainage on both side of Hwy 78 over to the town of Crane then south to New Princeton; Dry Lake Reservoir and Happy Valley Drainage to the crest of the Steens Mountains; the Blitzen Drainage from the headwaters south of Blitzen Crossing down to Frechglen; and then from Frenchglen down the remainder of the valley to following along Hwy 205 down to Mud Lake. Though this landmass is outside Refuge boundaries and includes other agency lands and private property, it outlines the landscape that impact the refuge and the watershed. The vision of the Refuge should project over the next 50 or more years. The vision should also incorporate the protection, restoration, and enhancement of all environmental disciplines that influence this natural system in order to maintain the integrity of the Refuge and sustain the productivity of this unique area. The vision must consider human and community impressions of the importance, validity, and need for the

Refuge and larger natural system in providing a positive benefit in their community and every day lives.

### **Closing Thoughts and Questions Monday June 1 (post introduction presentation)**

- How will you utilize the biological integrity, diversity, and environmental health mandate to evaluate and potentially restore to historic conditions?
- Will you be considering the site potential with reference to constraints – such as water rights, can you dry the site out, etc.
- I hope you have some really smart people thinking about climate change in arid systems as a complement to your assessment of historic conditions.
- Einstein said that beauty is founded on simplicity. Keep this in mind as the plan develops.

### **Closing Thoughts Friday June 5 and Post-Review Written comments**

- There must be other people dealing with Carp. Try to get a carp workshop together to discuss a strategy. Capture what has gone on in the past to get a historical context. Information should be pulled together. Information is in the narratives, which was the best information and ideas to share with others.
- Prioritize issues you have to deal with. Strategic habitat conservation will help the refuge work through that process. The management plans of neighboring agency will be used as a foundation. The bio review management plans could have been handed out, but because of staff and other reasons this was not done.
- Using process of collaboration would have been more focused on biology, the process will get more focused and priorities flushed out.
- Don't lose hope on the eradication of carp.
- Have a handbook process that come through plans and distill a focus species list that we can have habitat objectives in the CCP.
- We didn't touch on the Silvies River flood plain. What is the quantification of wildlife benefits from that system? From 1974 to the late 80's there is good information on the Silvies flood plain. This data needs to be analyzed and summarized.
- Where will the bio review take us? It will be developed for the refuge to adapt to change issues. The landscape vision is very important. Working with a diversity of people is the key to face the issues.
- There is a social and economical standpoint. Whatever the refuge does it affects the communities around it. There are 65,000 visitors/yr. Keep management goals in mind with economics of the surrounding areas. Keep the timing in context with change. Spotted frogs are in the upper part of the Blitzen. How do we work in context of creating habitat for the spotted frog that is a candidate species and may be listed as an endangered species? The BLM is trying to improve habitat up stream and there is quite a few populations north, west and east of Burns. Blitzen is an isolated population and creating areas throughout the system to make habitat would be beneficial.
- Summer Lake has given up returning to a natural system because of irreversible impact. Malheur NWR can still change back to nature and a more natural system.
- There has been a long running partnership with Summer Lake. Part of the CCP should be to keep partnership and communication open with migratory bird issues.

- Do more monitoring on Lake. Spring monitor for connectivity. Baseline data and photo documentation would be very useful for now and in the future.
- Contributions of this refuge are highly regarded and the refuge has a lot of support. The North American WFM plan is on queue to be rewritten. The plan will be bringing harvest and habitat people together. There are resources and networks of people that work on flyway level issues and they will help us. The refuge has a lot of supporters out there. Monitoring programs need to be in place to actively manage things. The refuge as a resource has so much potential. Wetlands need to be dynamic and have aggressive management at times.
- It needs to be stressed that supervision needs to occur with carp control. Without supervision ground is lost.
- The FWS is taking a big step on how they are approaching this task. Hope that it is positive. Use this process as an educational tool as well. This step is a vision process. Find tools to get there and make a plan.
- Thanks for organizing such a great refuge review.
- I think the invitees were well chosen. I particularly liked having the diversity from outside the Service family, including participants from the High Desert Partnership and Dr. Dobkin. I believe the link to conservation efforts beyond refuge boundaries, and the perspective of the role the refuge plays in a larger landscape context is an important perspective to maintain in developing this CCP.
- I want to reiterate Mig. Birds strong commitment to this CCP process, and offer our help when it comes to developing habitat and population objectives for birds in the CCP. As you know, the Intermountain West Joint Venture is itself developing implementation plans for waterbird, shorebird, and landbird groups in addition to waterfowl, and of course Malheur is one of several key sites in their planning area. Our shop is playing a leading role in those planning efforts, and we suspect information from these implementation plans will be easily translated into objectives and tasks to achieve Malheur's goals.
- For waterfowl and shorebirds, Malheur plays a critical role in providing breeding and migration habitat for several species. For landbirds, Malheur could play a much larger role than it does for riparian species, as we discussed during the review.
- The two big Goals mentioned repeatedly, Carp Removal, and River Restoration for the southern portions of the Donner und Blitzen rivers, are at least partially achievable in the 15 year horizon of the CCP. Achieving those two goals would be an incredible boost to breeding and migratory waterfowl, waterbirds, shorebirds, and riparian-dependent landbirds and provide a great vision for the refuge CCP.
- One thing that came up during the review was the idea of using refuge property to enhance habitat in other areas. I know that in the past permittees helped with irrigation and other infrastructure issues. I think there could be a two pronged approach (involving permittees and making some of the area more self-regulating) to the infrastructure problems Malheur refuge will be facing in the future. And it still comes back to giving some thought to how much water you have and what it takes to handle a particular job. So my ideas are:
- Figure out how much water you receive and what it would take to fill ponds, irrigate meadows, maintain some level of crane habitat, etc. and by subtraction, what will go to the lake. (I think there was some agreement that with carp that water is wasted, but

if you can get a handle on the carp, what would the potential be to do all the other stuff and still get water to the lake?)

- Decide what parts of the refuge are really better for hay production than habitat under current conditions. Would it be possible to let permittees take care of irrigating and infrastructure in these areas? Can we figure out a system that does not favor canarygrass? Look at all that we have in the meadows around the research center this year. Maybe a short irrigation season is worth trying, and then fall grazing when canarygrass greens up again. Or could there be conservation agreements for other areas?
- Which areas are most suitable to going back to some kind of low input, self-regulating system? How would you expand what has been done on the south end? And could that be done in a very gradual fashion? Maybe with funds that are derived from haying and grazing activities.
- Reconcile tension between mission and migratory birds and others – and the landscape level role of the refuge – hay, grazing uplands
- Make the refuge a research opportunity for invasives, land and water management
- Accept that the lake is compromised and decide how much the FWS tries to compensate for that by operating Blitzen and OO for those lost values
- Stay hooked in to the community and landscape
- Expend the effort in FTEs and base funding to meet those goals – end the cycle of project-driven, episodic management and change
- Carp – watch the weather, have a plan. Reduce the size of survivors – sterilization. Create incentive for harvest/take via derby, bounties, commercial harvest
- Blitzen: reclaim habitats, reconnect floodplain and tribs: Highline to Blitzen; Bridge Creek to Blitzen; above Busse through Cottonwood – Dreger; through Narrows and Krumbo valley; McCoy Creek! Get a professional stream restoration consult! Preferably from Rosgen himself – get a phased plan. Find \$ source, work south to north.
- River restoration: start small, experiment, use adaptive management. That way, if we end up with a bunch of invasives we can eliminate them and alter our approach. I suggest just starting with the Bridge Creek Canal as the 1st restoration project (as Gary Ivey suggests, this is a pretty easy effort).
- Questions on cool water temperature microhabitat refuges in the Blitzen could be addressed with fiber optic measurements of temperature in the river (as opposed to FLIR) – this would be cheaper than FLIR. This gives you continuous temperature measurements spatially as opposed to point measurements.
- I thought the collaborative process of the Bio Review was good and very educational. I think maybe it would be good to explain to outline the process for the week the 1st night: where are we going with the process; what are we doing. I wasn't sure that we were exploring everyone's vision of the refuge until the 2nd day or so.