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April 10, 2007

Board of Directors
Bridger Creek Property Owners' Association
P.O. Box 10514
Bozeman, MT 59719-0514

Re: Kruer review of development plans for Bridger Mountain Village.

Dear Board:

I've reviewed the materials related to the Bridger Mountain Village (BMV) Planned Unit Development (PUD) application and development plans submitted to Gallatin County in December, 2006 that were recently provided to me. As requested, I've attempted to summarize my thoughts on the existing conditions and natural resources in the Bridger Bowl Base and surrounding area and the environmental impacts on these conditions and resources that may result from the development planned by Bridger Canyon Partners (BCP), including indirect and secondary impacts. The focus of the current review is the development of 123 acres of Phase I of the PUD. Limits of available time and resources restrict this review to a general one. The overall work proposed in the PUD will, at a minimum, result in about 527 residential units being constructed on 350 mostly undeveloped acres of native plant communities, to include overnight and recreational housing, miles of new roads, accessory uses, a commercial village, ski lifts, and utility and service areas, including a sewage treatment plant.

I've reviewed the April 6, 2007, modification letter from Bridger Canyon Partners, LLC to Mr. Randy Johnson of the Gallatin County Planning Department. Although the proposed modifications reduce somewhat the intensity and scope of the original development proposed for BMV Phase I, my opinions expressed herein of the serious direct and secondary environmental impacts that will result over the long-term are not changed.

Introduction

My qualifications to perform this type of review are based on training and experiences during 32 years of private conservation consulting and government agency work. I worked as a field biologist for the Army Corps of Engineers Wetlands Regulatory Program for 8 years and have focused my work on wetlands and wetland ecology, habitat restoration, fisheries, exotic vegetation management, aerial photointerpretation, and GIS mapping. My resume is attached. Current clients include the National Wildlife Federation and the Everglades Law Center. I have resided in Montana since 1999 and clients here have included Montana Fish Wildlife and Parks, Montana Department of Transportation, Gallatin Local Water Quality Board, Beaverhead Conservation District, the Trust for Public Lands, and private firms. I participated in the development of the Phase I plan for the total maximum daily load (TMDL) program in the Beaverhead watershed. I lived for one summer season in Bridger Canyon and am familiar with the Bridger Bowl base area.

For this effort I also reviewed various aerial photographs and GIS maps, and ground photos taken by others, including a large set of quality color photos in the wetlands delineation report by Morrison-Maierle, Inc. During the course of this review I spoke with Ms. Shannon Johnson, the Project Manager with the Army Corps of Engineers Billings Office (406-657-5910) who reviewed the wetlands report and performed a site inspection, Mr. John Whittingham of Basic Biological Services, LLC in Dillon, MT, and members of the Board of the Bridger Canyon Property Owners Association (BCPOA). Mr. Whittingham authored a 1996 Montana State University Masters Thesis on the *Hydrogeology of Surficial, Unconsolidated, Quaternary Aquifers, Maynard Creek Catchment, Bridger Range, Montana*.

This review does not include an assessment of compliance of the proposed project to the Gallatin County and Bridger Canyon Zoning. Nor does it address the suitability of the covenants and design guidelines included the PUD application. Rather, this review assesses the supporting documents provided by Bridger Canyon Partners in the PUD application along with associated reports and other documents, some of which are described and commented on below.

Summary

Proposed is an intense commercial and residential development project that appears to far exceed the natural carrying capacity of the site for which it is proposed. Within Phase I alone there will be a minimum of 22 acres of new land clearing in mostly native habitats, extensive new roads with stream crossings, direct wetland and stream impacts, stormwater runoff, water quality degradation

especially during large stormwater events, and significant wildlife displacement and disturbance. There will be 9.5 acres of new road surface constructed. An evidently already impaired stream (Maynard Creek) will become further impaired, but without the protections afforded many other impaired streams in Montana. As well, expected secondary impacts over time, include but are not limited to, habitat fragmentation, off road vehicle use, spread of non-native plants, light and noise pollution, human disturbance of wildlife, road kills, downstream nutrient pollution, groundwater contamination. Reducing required stream setbacks from 150 feet to 50 feet will ultimately further degrade and disturb wetland and riparian habitats along the perennial streams on site. The importance of stream and riparian habitats to the maintenance and protection of the public resources of fish and wildlife and clean water was expressed by Montana Governor Brian Schweitzer in a letter to the DEQ, DNRC, and DFWP Directors on March 8, 2006:

"Development along rivers and streams that destroys protective riparian areas is possibly the single most urgent ecosystem threat facing Montana today."

And no mitigation plans have been submitted to justify a reduction of 100 feet in the required stream setback.

Platting lots with jurisdictional wetlands makes wetland protection much more difficult and non-jurisdictional wetlands virtually impossible to protect. Large general areas that include extensive wetland and riparian habitats have been identified for construction of cabins and multi-unit buildings but with no way to tell what the level of impact will be, where construction will occur, or the amount of wetland fill that will be necessary. Statements are made that wetlands will be avoided but only "to the maximum extent possible." Claims that the environmental and natural resource purposes of the Bridger Canyon General Plan and Zoning Regulations are being met cannot be supported. Statements that purposes have been met "while balancing the need to place development in the most suitable location" do not instill confidence that the natural carrying capacity of the land and the long-term needs of Bridger Canyon have been properly addressed.

Based on the applicant's geology report there are unresolved issues of shallow groundwater and unstable and clay soils in the Phase I area. A sewage treatment plant and discharge infiltration swales are proposed but with limited information on the long-term effects of infiltration on groundwater and downslope watercourses (Bridger Creek), or options for the disposal of solids. There are enough groundwater and geological concerns that the Gallatin County staff suggested that each building site should have additional foundation inspections prior to construction.

Noted here is the emphasis of the Bridger Canyon General Plan to favor "the conservation of natural resources, the preservation of open space and agricultural uses and limited, controlled growth." Along with this, the stated goal of BCP (p. 38, Master Plan) is "to develop a small community at the Base Area of Bridger Bowl that is very much in keeping with the Bridger Canyon Zoning Ordinance." In my opinion, the extensive, permanent direct and indirect environmental impacts that will result from the PUD mean that many of the goals and objectives of the Bridger Canyon Plan cannot be met by the project as proposed. This PUD should not be initiated in the Phase I area with its extensive wetland and stream and riparian habitats, and shallow groundwater, as it is the wettest, most diverse, and the most environmentally sensitive part of the entire PUD site. In addition to reduced development intensity, cluster development should be incorporated more into the development plan in order to avoid aquatic (stream, wetland, and riparian) habitats and to allow important maximum setbacks to be met throughout.

Reports, Documents, and Datasets Reviewed

Biological Integrity of Bridger Creek Based on Periphyton and Macroinvertebrate Community, Confluence Consulting, Inc., May 2001

This report for the Bridger Canyon Property Owners Association was produced by Confluence Consulting, Inc. of Bozeman, MT. Following data collection using standard methods the report identified nutrient problems in the otherwise healthy Bridger Creek below the confluence with Maynard Creek and identified Maynard Creek as the likely source of nutrients. The report recommended that the State of Montana be petitioned to have Maynard Creek listed on the State's 303(d) list of impaired streams for which watershed restoration plans would have to be developed under the EPA mandated Total Maximum Daily Load (TMDL) program. Baseline data on water quality, periphyton, and macroinvertebrate populations for the Phase I area are included. This work should be repeated.

Bridger Bowl Base Area Wetland Delineation Report, Morrison-Maierle, Inc., August 2006

This report by the developer's consultant used standard methods in an effort to delineate and map all wetlands in the PUD area. In a letter to Morrison-Maierle dated October 17, 2006, the Army Corps of Engineers formally stated which of the wetlands were deemed to be jurisdictional wetlands regulated by Section 404 of the Clean Water Act. Due to recent changes in how the Corps determines jurisdiction the truly isolated wetlands on site (those not directly connected to a watercourse) are no longer subject to Corps regulatory jurisdiction.

Before they can be filled, those that are subject to Corps jurisdiction are subjected to a public interest review process that includes a presumption that alternative sites are available for non-water dependent activities like commercial and residential development. As well, federal regulations require a 3-stage approach to project design - avoidance, minimization, and mitigation for unavoidable impacts. Ms. Johnson with the Corps in Billings advised that she has not yet seen a Section 404 permit application for the PUD but assumed one was forthcoming due to the scale and intensity of project plans, and the number of stream crossings required for new roads and other new work.

This Morrison-Maierle report refers to the PUD area as steep, forested terrain, with 8 perennial drainages and about 23 total acres of wetlands, much in Phase I and along Maynard Creek. The mapping reveals that much of the headwaters of Bridger Creek are located in the Phase 1 PUD area, along with their associated wetlands. A number of quality photographs showing healthy, diverse wetland plant communities throughout the project area are provided in the report as are the data forms used in the wetland delineations. Wetland types include those typical of the region - including riverine, riverine/slope slope, depressional, and slope/depressional. Many are spring fed.

A Planning Guide for Protecting Montana's Wetlands and Riparian Areas and *The 2006 Update of Case Studies,* by Janet H. Ellis and Jim Richard; a cooperative project of Montana Audubon, Montana Watercourse, and the Montana Department of Environmental Quality.

Since *A Planning Guide for Protecting Montana's Wetlands and Riparian Areas* was published in 2003, several regulations have been adopted by local governments that protect wetlands and/or riparian areas. In general, this planning guide provides extensive information on the public benefits and values that flow from Montana's healthy aquatic habitats such as those found on this PUD site.

Montana Case History: Gallatin County: Subdivision regulations were adopted in March 2005 in Gallatin County that contains stream setbacks for "any residential or commercial structure." The setback is 300-feet on the East Gallatin, West Gallatin, Madison, Jefferson, and Missouri Rivers; and 150-feet on "all other watercourses." The definition of "watercourse" includes all streams, drainages, waterways, gullies, ravines, or washes where "water flows either continuously or intermittently and has a definite channel, bed and bank." Gallatin County's protection of all perennial, intermittent, or ephemeral watercourses is unique in subdivision regulations. As an alternative to the setback, subdividers can develop a "watercourse mitigation plan," which is designed to mitigate the impacts of the subdivision on affected watercourses.

Bridger Bowl Base Area Planned Unit Development Wildlife Assessment, prepared by R. Eng and R. Mackie, July 2006,

Eng and Mackie note that the Bridger Mountain range is a highly complex and diverse environment providing quality habitat for important wildlife populations. The mix of native habitats in the area constitutes some of the most productive summer-reproductive habitats for wildlife in the Bridger Mountains. The most significant characteristic of wildlife habitat in the base area is the richness and diversity of the forest and riparian cover types that occur there. Bridger Bowl area provides productive habitat (including for reproduction) for a number of large carnivores and ungulates, with black bear, elk, white-tailed deer, mule deer, moose, rabbits and hares, and squirrels considered common in the area.

Eng and Mackie refer to the importance of the diverse riparian, aspen, and moist conifer habitats in the Base Area to area wildlife and migratory birds and report that heavy snowfall in the area and a high water table in a portion of the base area with meadows and well developed aspen stands also contribute to high production and maintenance of succulent forbs beneficial to a wide variety of animals.

The report notes that continued development in the base area may result in the area no longer being considered a major habitat for sustaining or producing mule deer in the Bridger Range and that the occurrence and use of the Bridger Bowl area by moose will likely decline as a result of additional development. They report that the habitat diversity of the base area is reflected by the presence of an equally diverse bird population with 70 species either observed or heard on site or expected at least seasonally in the base area. They note that 65% of those bird species observed on site are neotropical migrants, a suite of migratory birds some of which are in decline due to habitat loss and alteration.

The authors believe that special efforts are imperative to avoid fragmentation and loss of linearity among natural communities in the area. They note that the potential for both direct and indirect as well as cumulative impacts to wildlife from development exists in the base area and that detrimental human-wildlife interactions will occur with additional development and intrusion of humans into undeveloped habitat. They note also that increased vehicular traffic could also lead to greater mortality from road kills.

Due to their importance as productive habitats the wildlife assessment report recommends that maximum setbacks be required from wetlands, riparian zones and aspen groves.

Bridger Bowl Base Area Summary Geology and Soils Report, HKM Engineering, October 2006.

This reports notes that shallow groundwater was documented in parts of the site with even higher levels expected during wet conditions. They note that groundwater conditions vary but should not be a problem as long as conditions are considered for "site specific building designs." HKM reports isolated, minor unstable areas on the west edge of Phase I and they recommend that more detailed surface mapping take place "within the western area of Phase I to further determine is isolated unstable areas are present." The southwest portion of Phase I is where the sewage treatment plant and the associated infiltration beds will be constructed. Descriptions of clay and clayey-gravel soils across the site are found in the report. Concerns of soil instability, shallow bedrock and potentially limited groundwater in the Maynard Creek area are supported by John Whittingham (pers. comm., April 6, 2007).

Gallatin County Staff Report for the BCP PUD, submitted to the Bridger Canyon Planning and Zoning Commission in April 2007

page 17 - "Given the conclusions of the Geology Report, staff suggests that geotechnical foundation studies be conducted for all commercial and residential structures prior to construction." This appears to continue expression of some concern about the nature of the surface and subsurface geology at the site.

page 18 - "The watercourses and adjacent riparian areas will be located within common open space areas." However, a review of the various maps in the PUD application reveals that this may not be the case as many wetlands and riparian habitats will be on subdivided or otherwise developed property, where their protection is not insured.

page 19 - "As a condition of PUD approval, staff suggests that the applicant prepare a Wildlife Management Plan for the PUD which incorporates all wildlife mitigation recommendations provided in the Wildlife Assessment."
The wildlife assessment firmly acknowledges serious impacts to wildlife habitat and ultimate diminishment of wildlife values in the area. Typically loss and degradation of native habitat on this scale cannot be mitigated.

GIS coverages, Aerial Imagery, Water Quality Data, and Other Information Available through the Montana Natural Resources Information System (http://nris.mt.gov)

NRIS is a rich resource for Montana citizens and professionals and provides valuable, important information on Montana's natural habitats and native plant communities, and water resources (http://nris.mt.gov/wi.asp). Both Bridger Creek and Maynard Creek are reported as managed as trout water with Bridger Creek considered to be chronically dewatered in the lower 10 mile reach. Development impacts to the aquatic habitats in the tributaries of Bridger Creek will only worsen this problem. The Clean Water Act Information Center reports that some beneficial uses of Bridger Creek are impaired with the creek only partially supporting aquatic life, cold water fishery and primary recreation contact. Probable causes for this impairment are elevated chlorophyll-a, and phosphorus and nitrogen enrichment with probable sources including impacts from resort areas (winter and non-winter resorts), unpaved roads, and grazing. A TMDL is required for Bridger Creek and other portions of the downstream Gallatin watershed but has not yet been initiated according to DEQ.

Bridger Canyon Village Storm Water Assessment, Morrison-Maierle, Inc., October 2006.

Morrison-Maierle states that conditions in the area present "interesting, but manageable challenges." They note that the site is in a high precipitation area with heavy snowfalls and runoff. They intend to "minimize" erosion and "minimize disruption of stream courses." They acknowledge that "runoff will be passed through the site in the natural drainage courses already present." They state that grass swales will be "used wherever possible." Designs are for only the 25 year storm event. The overall objective of the storm water and drainage program is to provide "adequate protection" to the natural features of the area - but adequate is never defined. Bioswales will only be used at parking areas to manage runoff where the number of spaces is more then 10 (Master Plan, page 14).

*Nonpoint source pollution comes from activities on the land that leads to pollutants in storm water runoff, snow melt and groundwater, and into streams and lakes. The most common pollutants are excessive soil and nutrients. These and other pollutants harm aquatic life, increase costs for water supplies, and impact recreation (*DEQ Planning, Prevention & Assistance e-mail press release, 4 7/07)

Bridger Mountain Village PUD Submittal Master Plan, December 2006

page 14 - "Water courses, jurisdictional wetlands and drainages will be preserved.....". But wetland fill in jurisdictional wetlands will be needed for road crossings and possible other sites, large non-jurisdictional wetlands are at risk, and alteration of hydrology and the effects of storm water runoff are not taken into account in this statement

page 27 - It is acknowledged here that some wetlands will be impacted and mitigation will be used to offset the loss - but no mitigation has been identified.

page 27 - The claim is made that "wildlife patterns have been adjusted" to the historic uses of the area, and "It is acknowledged that additional human activity will have influence on wildlife" but they state that those impacts can somehow simply be "minimized with the preservation of stream corridors."

There is a conflict between Map 5A (Future Development POD Sites and Slope) in the Master Plan and Map 1A (Master Plan) regarding the location and extent of areas designated for housing, especially in the Corral Creek, Twin Forks, and Spotted Pony subdivided areas. And there is a conflict and confusion between Map 6A of the Master Plan and the wetland delineations as they appear in Map 1B - the Phase 1 Site Plan. The combined wetland areas (riparian, forested and emergent) delineated in Map 6A appear to be more expansive than those mapped in Map 1B and the vegetated riparian zone appears much more continuous along the various watercourses.

Open Space Analysis, Morrison-Maierle, Inc., December 2006

page 3 - "There are many project components that are in the initial design phase and may need to be modified. Additional uses are programmed within the Phase I boundary that are not specifically identified at this time." This suggests that additional uses and ultimately their potential environmental impacts might be placed into the PUD.

I hope this review has provided useful information to the Bridger Canyon POA, possibly pointed out where conflicts in the information submitted with the PUD application may exist, and where expressions of compliance with the Canyon Plan goals and objectives might be exaggerated.

Sincerely,

Curtis R. Kruer

RESUME

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Education: **Bachelor of Arts. Jacksonville University, Biology, 1972**
Master of Sciences. University of South Florida, Department of Marine Science, Marine Sciences, 1977

Training, Experience, and Expertise:

Coral reef ecosystem and benthic habitat mapping and assessment; aquatic resource (wetland and riparian) and terrestrial habitat mapping; wetland delineation; aerial photo interpretation; Geographic Information System map creation; restoration, enhancement, and management of aquatic habitats; mitigation of wetland and shallow water development impacts; water quality monitoring and assessment; ecology of tropical wetlands and shallow water seagrass habitats; impacts of development on coastal habitats; environmental impacts of boating on seagrass habitats; project management; environmental laws and regulations; trial testimony as an expert and fact witness; threatened and endangered species; invasive exotic vegetation; taxonomy and ecology of tropical reef fish; design, construction, and monitoring of artificial reefs; freshwater wetland resources of the Florida Keys; commercial diving; past member Florida Keys National Marine Sanctuary Water Quality Protection Program, Technical Advisory Committee

Current and Recent Employment:

Contract work for government agencies, nongovernmental organizations, and private industry as a consulting and research biologist with a focus on GIS habitat mapping and natural resource conservation (e.g. Montana Fish, Wildlife and Parks, Montana Dept. of Transportation, Montana Department of Environmental Quality, Gallatin Local Water Quality Board, Beaverhead Conservation District, National Wildlife Federation, Everglades Law Center, U.S. Department of Justice, U.S. Fish and Wildlife Service, U.S. Geological Survey, National Oceanographic and Atmospheric Administration, Florida Marine Research Institute, Florida Department of Community Affairs, Florida Natural Areas Inventory, Camp, Dresser and McKee, Inc., KirK Environmental LLC, and private land owners). Vice President of Coastal Resources Group, Inc., a nonprofit committed to conservation of coastal marine resources.

Work Experience:

Research Assistant, Jacksonville University, 1970-72
Graduate Assistant, University of South Florida, Department of Marine Science, St. Petersburg, 1973-74
Research Assistant, University of South Florida, Department of Marine Science, 1974
Self-employed, commercial diving, Jupiter, Florida, 1975-76

Biologist, Wapora, Inc., Washington, D.C., Jupiter, Florida Office, 1976-77
Biologist, Florida Department of Environmental Regulation, Marathon, Florida, 1977-79
Environmental Specialist, Florida Department of Environmental Regulation, Marathon, Florida, 1979-1980
Biologist, U.S. Army Corps of Engineers, Big Pine Key Regulatory Field Office, 1980-88
Assistant Scientist, Cooperative Wildlife Research Lab (Florida Keys), Southern Illinois University, Carbondale, 1988-90
Manager, Florida Keys Environmental Restoration Trust Fund, 1990-1999
Self-Employed Consulting and Research Biologist, 1988 to 2007

Professional Affiliations:

Society for Conservation Biology
Society of Wetland Scientists
Association of State Wetland Managers
National Association of Environmental Professionals
Rocky Mountain Chapter Association of Environmental Professionals

Publications, Documents, Technical Reports, etc.:

Cairns, K. and C. Kruer. 1996. The restoration and management of the Keys West Salt Ponds. Subcomm. On Managed Marshes, 3rd Workshop on Salt Marsh Management and Research U.S. Fish and Wildlife Service, Vero Beach, FL.

CDM, Inc., KirK Environmental and C. Kruer. 2003. Beaverhead Watershed TMDL Draft Phase I Assessment. Rep. prep. For Beaverh. Watersh. Comm. and Montana Dept. of Env. Qual., Helena, MT.

Folk, M.J., W.D. Klimstra, C.R. Kruer, and M.L. Folk. 1990. Special report: Key deer accessibility to all of Big Pine. Rep. to U.S. Fish and Wildl. Serv., Atlanta, Ga., 41 pp.

Folk, M.L., W.D. Klimstra, and C.R. Kruer. 1991. Habitat evaluation; National Key Deer Range, Fla. Game and Freshwater Fish. Comm., Nongame Wildl. Prog. Proj. NG88-015, 366 pp. plus appendices and map volume.

Hobbs, J., P. McNeese and C. Kruer. 2006. Pieces of the Real Florida Keys, Twenty-Five Years of Habitat Restoration, 1981-2006, Keys Environmental Restoration Fund. National Audubon Society, Miami, FL, 191 pp.

Kendall, M.S., C.R. Kruer, K.R. Buja, J.D. Christiansen, M. Finkbeiner, R.A. Warner, and M.E. Monaco. 2001. Methods used to map the benthic habitats of Puerto Rico and the U.S. Virgin Islands. NOAA NOS NCCOS CCMA Tech. Report 152. Silver Springs, MD, 45 pp.

Kendall, M.S., C.R. Kruer, K.R. Buja, J.D. Christiansen, E. Diaz, R.W. Warner, and M.E. Monaco. 2004. A characterization of the shallow-water coral reefs and associated habitats of Puerto Rico. Gulf and Carib. Research, v. 16(2): 177-184.

Kendall, M.S., K.R. Buja, J.D. Christiansen, C.R. Kruer and M.E. Monaco. 2004. The seascape approach to coral ecosystem mapping: an integral component of understanding the habitat utilization patterns of reef fish. Bull. Mar. Science. v. 75(2):225-237.

Kruer, C. R. 1977. Final report for June, 1976 - May, 1977 field work - U.S. Environmental Protection Agency 316 (b) Studies, Orlando Utilities Commission Indian River Power Plant.

Wapora, Inc., Wash., D.C. 68 pp. plus appendix.

-----. 1977. Biological and water quality studies in the Indian River at the Indian River Power Plant. Rep. to Wapora, Inc., Wash., D.C. 45 pp.

-----. 1977. A study of the natural reefs off Tampa Bay, Florida Gulf Coast. Masters Thesis, Univ. of South Florida, Dept. Marine Science, St. Petersb., 172 pp.

-----. 1978. Background ecological data and literature search, Indian River Power Plant 316(b) considerations. Wapora, Inc., Wash., D.C. 82 pp.

-----. 1992. User impacts to shallow water resources of the Florida Keys. Procs. of First Ann. Coral Reef Coalition Conf., Key West, FL, pp. 11-14.

-----. 1992. An assessment of Florida's remaining coastal upland natural communities: Florida Keys. Fla. Nat. Areas Inventory, Tallahassee. 71 pp. plus appendix.

-----. 1993. Artificial reefs of the Florida Keys, in B. Horn, ed., Florida Artificial Reef Summit 1993. Fla. Dept. of Env. Prot., Tallahassee, pp. 79-83.

-----. 1993. Summary of water level monitoring, Parks B. Banks property, Big Pine Key, Monroe County, Florida. Final Rep. to the U.S. Dept. of Justice, U.S. Attorney Office, Miami, FL, 23 pp.

-----. 1994. Mapping assessment of vessel damage to shallow seagrasses in the Florida Keys. Final Rep. to Florida Dept. Nat. Res. and Univ. So. Florida Inst. Oceang. F.I.O. Contract #47-10-123-L3, 26 pp.

-----. 1994. Boating impacts to seagrass habitats in Florida. in The Environmental Impacts of Boating; Procs. of a Workshop held at Woods Hole Oceanographic Institution, December 1994, ed. By Crawford, R., N. Stolpe and M. Moore. Woods Hole Oceanogr. Inst., Mass., WHOI-98-03, pp. 32-39.

-----. 1995. Assessment of seagrass restoration options in the Florida Keys. Rep. to U.S. Dept. Justice, Env. Defense Sect., Wash. D.C., 17 pp.

-----. 1995. Florida Keys Advance Identification Project, Wetland and Seasonal High Water Delineation. Rep. to U.S. Env. Prot. Agency, Reg. 4, Atlanta, GA, 10 pp. plus attachments and maps.

-----. 1995. Florida Keys invasive exotic vegetation removal project, Phase I - mapping and assessment. Rep. to Fla. Keys Env. Mit. Trust Fund, Fla. Aud. Soc., Trustee, Summerland Key, Fl, 23 pp. plus appendices.

____. 1997. Freshwater Wetlands. in The Florida Keys Environmental Story – A Panorama of the Environment, Culture and History of Monroe County, Florida. Monr. Co. Env. Ed. Adv. Coun., Big Pine Key, pp 43-45.

____. 1997. Conserving Marine Life with Artificial Reefs. in The Florida Keys Environmental Story – A Panorama of the Environment, Culture and History of Monroe County, Florida. Monr. Co. Env. Ed. Adv. Coun., Big Pine Key, pp 260-261.

-----. 1998. Background information and recommendations for an outreach and education program to protect seagrass habitats from boating impacts in the Florida Keys National Marine Sanctuary. Rep. prep. for the Seagrass Summit, Key Largo, Fl, 12 pp. + photos.

-----. 1998. Port Pine Heights Wetlands Restoration Project, Rep. prep. for the National Key Deer Refuge, Big Pine Key, Fl and the Fl. Dept. of Env. Prot., Ft. Myers, 19 pp + photos and figs.

-----. 1999. Summary of the restoration of 1.4 acres of freshwater wetlands at the Shepard Tract on Big Pine Key, Florida, 1986-1999. Rep. prep. for the Florida Keys Environmental Restoration Trust Fund, Tavernier, FL, 13 pp. + photos.

----. 2001. A Report on Two Seagrass Restoration Projects in the Lignumvitae State Management Area, Monroe County, Florida - Construction and Time Zero and Year One Monitoring. Rep prep. for the Fla. Keys Env. Rest. Trust Fund, Tavernier. 36 pp.

___. 2002. Evaluation of an in-lieu-fee wetlands mitigation program for the State of Montana. Rep. prep for the Montana Dept. of Transp., Helena, 21 pp + attachs.

___. 2002. An evaluation of capabilities of IKONOS high resolution color satellite imagery for mapping shallow-water coral reef ecosystems in the U.S. Virgin Islands. Rep. to Nat. Oceangr. and Atmosph. Admin., Silver Spring, MD, NOAA Contract No. 40AANC107350, 6 pp + tables.

___. 2002. An evaluation of capabilities of Quickbird II high resolution color satellite imagery for mapping shallow-water coral reef ecosystems in the U.S. Virgin Islands. Rep. to Nat. Oceangr. and Atmosph. Admin., Silver Spring, MD, NOAA Contract No. 40AANC107350.

___. 2003. Fishery data interpretation for the East Deer Lodge Valley, Montana. Rep. prep. for KirK Environmental, LLC, Sheridan, 8 pp + maps.

___. 2004. Aerial assessment and mapping of 303(d) listed impaired streams in the Beaverhead watershed. Rep. prep. For CDM, Inc,. and the Montana Dept. Env. Qual., Helena, digital GIS coverages and assoc. data.

___. 2004. Wetland and riparian mapping and prioritization for NAWCA proposal in the Madison and Gallatin River Watersheds. Rep. prep. For Montana Fish, Wildlife and Parks, Bozeman, MT.

___. 2004. Development of the Fee Cost-Basis for In-Lieu-Fee Aquatic Resource Mitigation Projects in Montana. Rep. prep. for Montana Fish, Wildlife and Parks, Bozeman, 18 pp + attachments.

Kruer, C.R., T. Armstrong and P. Braisted. Invasive Exotic Vegetation Mapping in the Florida Keys - 1996. Final Rep. prep. for the Florida Keys Invasive Exotics Task Force. 12 pp. + 71 maps and legends and CD-ROM.

-----, and L. Causey. 1992. The use of large artificial reefs to enhance fish populations at different depths in the Florida Keys. Natl. Mar. Fish. Serv. MARFIN # NA89-AA-HMF179, St. Petersburg, 208 pp.

-----, R. Lewis, and R. Ehrig. 1999. Florida Keys Invasive Exotic Vegetation Removal Project - Mapping and Assessment. Procs. of a Joint Conf. of the Florida Exotic Pest Plant Council and the Florida Native Plant Soc., June 1998. Florida EPPC, Tallahassee, FL, pp 43-62.

-----, and J. Taylor. 1999. North Key Largo Invasive Exotic Plant Mapping and Assessment. in Procs. of a Joint Conf. of the Florida Exotic Pest Plant Council and the Florida Native Plant Soc., June 1998. Florida EPPC, Tallahassee, FL, pp. 67-80.

Lewis, R.R., and C.R. Kruer. 2006. Boating impacts to seagrass meadows and seagrass residents. Pages 243-247 in Program and Presentations of the Boating and Waterways Management in Florida meeting, Cocoa Beach, Florida, November 1-3, 2006.

Lewis, R.R., C.R. Kruer, S.F. Treat, and S.M. Morris. 1994. Wetland mitigation evaluation report - Florida Keys bridge replacement. Rep. to the Fla. Dept. Trans., FL-ER-55-94, 88 pp. plus appendices.

Lewis, R.R. III, C. R. Kruer, and A.B. Hodgson. 1999. Seagrass Distribution in Biscayne National Park. Tech Rep. 99-388, prep for Biscayne National Park, U.S. Dept of Inter., Homestead, FL by Lewis Env. Servs., Inc., Tampa, FL, 13 pp + maps.

Lewis, R.R., A.B. Hodgson, M. Tooze, and C.R. Kruer. 2002. The distribution of seagrass and benthic habitats westward of the patch reef system boundary of Biscayne National Park, Florida, USA. In Greening, H.S. ed. 2002 Proceedings, Seagrass Management, It's Not Just Nutrients! Symposium held August 22-24, 2000, St. Petersburg, Fl, pp. 125-132.

Lewis, R.R., A.B. Hodgson, P.L. McNeese, and C.R. Kruer. 2005. Rapid Ecological Assessment (REA) (Phase I) for Mangroves Within the Runway 07-25 Clear Zone, Naval Air Station Key West (NASKW), Boca Chica, Monroe County, Florida (draft). Rep. prep. for U.S. Navy, Key West, 38 pp.

McNeese, P.L., C.R. Kruer, W.J. Kenworthy, A.C. Schwarzschild, P. Wells, and J. Hobbs. 2005. Topographic restoration of boat grounding damage at the Lignumvitae Submerged Land Management Area, in Submerged Aquatic Habitat Restoration in Estuaries: Issues, Options & Priorities, Mote Marine Laboratory, Sarasota, FL (in press).

Reid, J.P., C. Kruer, L.W. Lefebvre, H.I. Kochman, and W. Martinez. 1995. Distribution of radio-tagged manatees in relation to near-shore habitats at Roosevelt Roads Naval Station, Puerto Rico (abs.). Eleventh Biennial Conference on the Biology of Marine Mammals, Orlando, FL.

Reid, J.P., and C.R. Kruer. 1998. Mapping and characterization of nearshore benthic habitats around Vieques Island, Puerto Rico. Rep. To U.S. Navy. U.S. Geological Survey/BRD, Sirenia Project, Gainesville, Fl 11 pp. + maps.

Sargent, F.S., T.J. Leary, D.W. Crewz, and C.R. Kruer. 1995. Scarring of Florida's seagrasses: assessment and management options. Fla. Mar. Res. Inst. Tech. Rep. TR-1, Florida Dept. Env. Prot., St. Petersburg, FL. 37 pp. plus appendices.

Zieman, J.C., F. Sargent, J.W. Fourqurean, and C. Kruer. 1995. Benthic habitat mapping of the Florida Keys National Marine Sanctuary and Florida Bay (abs.). Third Thematic Conference on Remote Sensing for Marine and Coastal Environments, Seattle, WA.