Forest Certification and Ecological Classification Systems
The Potential for Shared Objectives and Benefits

Kathryn Fernholz

Dr. Jim Bowyer
Matthew Wenban-Smith

February 20, 2007

Dovetail Partners, Inc.

Forest Certification and Ecological Classification Systems

The Potential for Shared Objectives and Benefits

Introduction

An area of notable evolution within forestry over the past several decades has been the expansion of the types of information foresters utilize in making management decisions. Traditionally, foresters have looked at growth and yield data and measures such as site index to define site potential and management alternatives. In recent years, another tool has been increasingly utilized to aid in identifying management alternatives and to help in decision-making. This tool is the Ecological Classification System.

The adoption of Ecological Classification Systems, also called ECS, has been driven, in part, by foresters' professional development interests and a need to address a broader range of ecological considerations in decision-making. ECS had also gained increased importance in recent years because of the need to meet forest management certification standards.

This report provides an overview of Ecological Classification Systems, how they are developed and used, and how they fit within the expectations and requirements of forest certification programs. Specific examples of systems developed and used in the Upper Midwest are included.

Introduction to Ecological Classification Systems

An Ecological Classification System identifies, characterizes and delineates ecological units at various scales and provides a common planning and management framework for county, state, federal and private landowners and managers[1]. In other words, an Ecological Classification System is a technique for defining ecosystems, and the primary objective in using an ECS is to standardize the classifications in such a way that key ecosystem characteristics can be used to support accurate and consistent decision-making. A well-developed ECS creates opportunities for land managers to fairly quickly gain a deep understanding of the landscape they are working in and the management limitations and opportunities it offers.

Developing an ECS

An ECS can be developed to fit a variety of scales. In the United States there are ECS frameworks designed at national, state, county, multi-county, and sub-county scales. The scale of the ECS depends on several factors including the interests of the party developing the system, the diversity of the ecosystems being classified, and, of course, available funding and other resources.

[1] http://www.eqb.state.mn.us/SDIdirectory/26.html

Regardless of the scale of the landscape being addressed, the development of a complete Ecological Classification System involves data collection, analysis and mapping. The scale at which the ECS will be applied determines the design and intensity of this process. For example, an ECS may include a hierarchy of classifications that provides varying degrees of detail at the different levels of the system, such as the ECS developed by the Minnesota Department of Natural Resources (Figure 1).

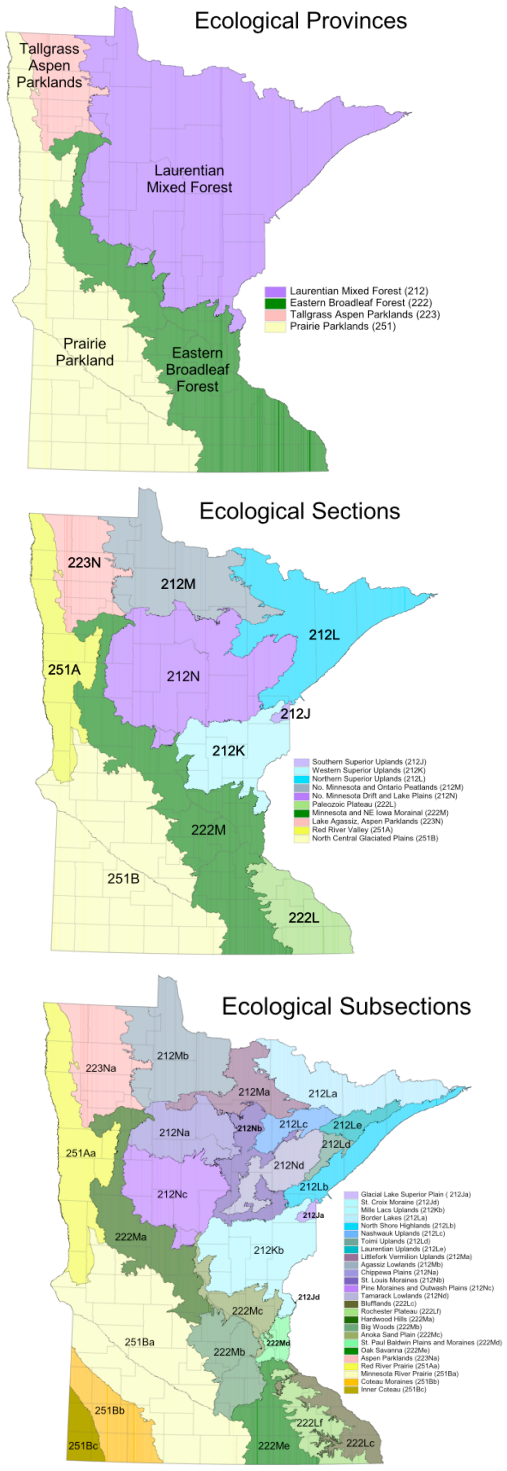
When considering larger land areas (e.g. Provinces) that encompass a number of counties, classifications are based on large geological or climatic influences and the level of detail is low. At this level, sufficient data may already exist to generate the ECS classifications.

At more detailed levels that correspond, for example, to particular forest stands, plant communities and soil types become useful in understanding the ecosystems that are present. At this level, field data collection is needed and researchers may establish permanent sample plots.

A hierarchical approach divides the landscape into increasingly detailed ecosystem units based on the application of an increasing number of ecosystem characteristics. In Minnesota there are four units at the Province level, 10 Ecological Sections, and 26 Subsections. The system includes three additional levels of detail beyond those illustrated in Figure 1.

The Minnesota system illustrated in Figure 1 was developed following the *National Hierarchy of Ecological Units* developed by the Forest Service.

Figure 1.
Ecological Land Classification Hierarchy
Minnesota Department of Natural Resources



http://www.dnr.state.mn.us/ecs/index.html

The Forest Service system includes eight levels, six of which occur and are utilized in the Minnesota system. The Forest Service began moving toward an ecological classification system in the 1970s, and the National Hierarchical Framework of Ecological Units, was officially adopted in 1993[2]. The Forest Service approach has provided a valuable framework for other ECS efforts.

Applying an ECS

Because an ECS is based on ecological characteristics, one of the first challenges to applying an ECS is ensuring that practitioners can identify selected characteristics accurately and consistently in diverse field situations. Often the application of an ECS system may require a refresher course in plant identification, and it may also mean that more forest inventory work needs to be scheduled to occur during the growing season when some ecological indicators are more readily available.

After the data collection, analysis and mapping are completed, and the ECS is established, the next step is to integrate the new tool into forest inventory, management and planning activities, and decision-making.

Using an ECS can represent a significant change in operations for a land management organization. Data collection techniques, data entry, computer mapping programs and training needs may all need to be adjusted to accommodate the new tool. Accepting this degree of change is not a decision made lightly by any organization, and to gain support for this change it has been critical that proponents of ecological classification systems demonstrate that the benefits can and will outweigh the costs.

Examples of Ecological Classification Systems & Their Impacts

Minnesota DNR – ECS & Native Plant Communities

As described earlier, and shown in Figure 1, the Minnesota Department of Natural Resources has established a statewide ECS built upon the framework of the system developed by the USDA Forest Service. In addition, the Minnesota DNR has developed a system of *Native Plant Community Classification* that adds a valuable level of detail and provides further tools for field application[3].

According to the Minnesota DNR, the native community classification provides "a framework and common language for improving our ability to manage vegetation, to survey natural areas for biodiversity conservation, to identify research needs, and to promote study and appreciation of native vegetation in Minnesota[4]."

[2] For more information about this history of ECS: http://iic.gis.umn.edu/finfo/ecs/history.htm
[3] http://www.dnr.state.mn.us/npc/index.html
[4] http://www.dnr.state.mn.us/npc/classification.html

The link between the overall ECS and the native plant community classification is clarified in a series of DNR field guides. The guides to the native plant communities are structured within the Province level of the ECS: *Field Guide to the Laurentian Mixed Forest Province*, *Field Guide to the Eastern Broadleaf Forest Province*, and *Field Guide to the Prairie Parkland and Tallgrass Aspen Parklands Provinces*.

As the Minnesota program has developed, significant commitments have been made to providing the systematic training that is necessary to ensure the new tools are used effectively.

In 2006, the University of Minnesota Sustainable Forest Education Cooperative began offering a new course, "Silvicultural Application of Minnesota's Ecological Classification System.[5]" The course is specifically designed to translate the theories behind ECS into field applications and forest management decision-making. By June 2007, a total of 60 natural resource managers will have completed the course. Participants have included a wide range of private and public land managers including state, federal, tribal and county forestry personnel.

Wisconsin DNR – ECS & Habitat Typing

Similar to the Minnesota DNR, the Wisconsin DNR Division of Forestry uses an ecological classification system that is also based on the national framework of the USDA Forest Service. The scales used by the Wisconsin DNR are Province, Section, Subsection, and Landtype Association[6]. Also, like the *Native Plant Community Classifications* in Minnesota, an additional ECS resource in Wisconsin is the habitat typing system developed by Kotar[7] et.al.

To clarify the relationship between the ECS system patterned after the national framework and the locally developed habitat typing system, the Wisconsin Forest Accord was developed in 1994 as an agreement among agencies, forestry organizations, and conservation groups in Wisconsin. The Accord pledged shared organizational support for "the continued development, evolution, and application of the Forest Habitat Type Classification System (FHTCS) and the National Hierarchical Framework of Ecological Units (NHFEU)." The agreement clarifies that the two systems "are complementary and can work together to achieve better resource communication". In terms of application and integration of the systems, in practice the habitat typing provides the site-level and vegetative component of the Wisconsin approach. The habitat typing materials also include silviculture guides to aid in identifying management alternatives.

---

[5] A grant from the Blandin Foundation provided support for this training. More information is available at: http://www.blandinfoundation.org/html/public_vital_grants_projects.cfm

[6] For more information: http://www.dnr.state.wi.us/org/land/forestry/ecolandclass/

[7] Dr. John Kotar, senior scientist in the Department of Forest Ecology and Management at the University of Wisconsin – Madison.

The applications and impacts of the Wisconsin ECS have been diverse and significant. For example, one of the first applications of the Habitat Typing Classifications was to revisit and enhance the interpretation of the 1996 Wisconsin Forest Inventory data[8]. This research helped demonstrate the correlation between the habitat types and tree species productivity. This research also enhanced the habitat typing system with the additional information provided by more than 5,000 Forest Inventory Analysis (FIA) plots. The system has also been used to predict which ecosystems might be most impacted by gypsy moth and how various forest types might respond to an infestation[9].

The Wisconsin DNR's Silviculture Handbook[10] lists three basic functions for the forest habitat type classification system:

- Management Interpretation -- Enabling resource managers to develop long-term management objectives and specific prescriptions for manipulating vegetation based on knowledge of the ecological potential of the land.
- Communication - Providing managers and researchers with a common language for describing forest communities and sites.
- Research - Providing a framework for systematic gathering and interpretation of research data and empirical knowledge.

According to the Wisconsin DNR, habitat typing "provides a tool to improve the process of assessing site potential and evaluating management alternatives…land managers are better able to assess site capabilities, identify ecological and silvicultural alternatives, predict the effectiveness of possible silvicultural treatments, evaluate feasible management alternatives, and choose appropriate management objectives"[11].

Additional ECS Applications

Ecological Classification Systems have also been developed for lands owned and managed by UPM Blandin Paper Company and lands previously owned by Boise Cascade Corporation in Northern Minnesota. Menominee Tribal Enterprises in Wisconsin and the White Earth Tribe in Minnesota have also been involved with habitat typing. Several County Land Departments in Minnesota have implemented Ecological Classification Systems, including Aitkin, Cass, Itasca, and Lake.

It is notable that many of the forest management organizations that have been leaders in ECS developments are also participants in third-party forest management certification programs. The correlation between ECS and forest management certification is more than a coincidence.

---

[8] http://fr.cfans.umn.edu/publications/proceedings/improving_forest_productivity/papers/KOTARP~1.PDF

[9] http://www.dnr.state.wi.us/org/land/Forestry/fh/GM/gmguide.htm

[10] Silviculture and Forest Aesthetics Handbook, 2431.5. http://www.dnr.state.wi.us/ORG/LAND/FORESTRY/Publications/Handbooks/24315/

[11] http://www.dnr.state.wi.us/Org/land/Forestry/Publications/Handbooks/24315/12.pdf

Links to Ecological Classification Systems in Forest Certification Standards

Both of the leading forest certification programs used in the United States (SFI and FSC) make reference to the use of an ecological classification system in their certification standards for forest management.

SFI & ECS

The most explicit mention of ECS within the Sustainable Forestry Initiative (SFI) Standard[12] is included in Objective 1. The emphasis of this Objective is that sustainable forestry be based on the best scientific information available.

Performance Measure 1.1 states:

"Program participants shall ensure that the long-term harvest levels are sustainable and consistent with appropriate growth-and-yield models and written plans."

The first indicator under this Performance Measure is that program participants have:

"a long-term resource analysis to guide forest management planning at a level appropriate to the size and scale of the operation, including a) a periodic or ongoing forest inventory, b) a land classification[13] system, c) soils inventory and maps where available, d) access to growth-and-yield modeling capabilities, e) up-to-date maps or a GIS, f) recommended sustainable harvest levels; and g) a review of nontimber issues…"

This reference to land classification and the link that is made between its use and the concept of "best available science" is a strong recognition of the role an ECS can play within the traditional collection of forest inventory information. Besides Objective 1, a land manager's use of an ECS can help address additional aspects of the SFI Standard, as illustrated in the following examples taken from SFI Audit Reports[14].

Examples of SFI Audit Findings Referencing ECS

Wisconsin County Forests

In the most recent SFI Report for the Wisconsin County Forest System reference is made to the use of habitat typing as aiding in addressing a performance measure which requires land managers to "implement management practices to protect and maintain forest and soil productivity."

[12] http://www.sfiprogram.org/generalPDFs/SFBStandard2005-2009.pdf

[13] SFI defines land classification as: "The process of generating and applying land strata that are sufficiently homogeneous in their physical, vegetative, and development attributes."

[14] SFI Audit Summary Reports are available at: http://www.sfiprogram.org/auditreports.cfm Some SFI certificate holders (e.g. public land managers) provide additional information and full reports at their own organizational websites.

The SFI Audit Matrix notes:

> "Habitat type system extensively employed … this provides guidance regarding soil moisture class and potential for compaction.[15]"

Wisconsin DNR

In the SFI review of the Wisconsin DNR's forest management, reference is made to the habitat typing system for demonstrating compliance with SFI requirements for judging adequate regeneration, use of soils maps, identifying compaction potentials, and avoiding excessive soil disturbance.

The SFI Audit Matrix notes:

> "Confirmed [use of soil maps] by reviewing state forests master plans and habitat type maps and by interviewing field foresters, who were knowledgeable about soils, habitat types, and their use in soil protection.[16]"

Minnesota DNR

The SFI review of the Minnesota DNR also noted the use of the ECS and its potential as a forest management tool.

The SFI Audit Summary Report for the Minnesota DNR notes:

> "The Minnesota DNR has made significant investments in science and technology, particularly for tools related to site classification and landscape scale analysis to support management decisions… There is an opportunity to improve the use of native plant community classification and associated management guidelines to help guide a broad range of site-related silvicultural decision-making.[17]"

FSC & ECS

There are at least two areas in the Forest Stewardship Council (FSC) standard where the use of an ESC can serve as an indicator of compliance.

Principle 6 of the FSC standard addresses conserving biodiversity, water resources, soils, and ecosystems by maintaining ecological functions and natural cycles. An indicator for this section of the standard states: "Forest owners or managers maximize habitat connectivity to the extent possible at the landscape level (e.g., through an ecological classification system, at the subsection or land-type association level).[18]:"

---

[15] www.dnr.state.wi.us/ORG/LAND/forestry/certification/pdf/SFI_FINAL_WI_CO_Forest_MATRIX.pdf

[16] www.dnr.state.wi.us/ORG/LAND/forestry/certification/pdf/MATRIX_WDNR_14_State_Forests_FINAL.pdf

[17] http://www.sfiprogram.org/AuditPDFs/SFI%20Audit%20Summary%20for%20Minnesota%20DNR.pdf

[18] Indicator 6.3.b.4 from the *Regional Forest Stewardship Standard for the Lake States-Central Hardwoods Region (USA) Version LS V3.0.*

To demonstrate compliance with Principle 6, land managers are required to complete an assessment of current conditions including disturbance regimes, successional pathways, rare communities, common plant/animals and habitats, water resources, and soils. Land managers also need to compare current conditions to historical and desired future conditions, and the results of this process are to be used to derive management options and activities[19]. The use of an ECS that has been developed with the inclusion of these considerations can help fulfill the requirements of FSC's Principle 6.

The second area of the FSC standard that references ECS is Principle 8. This principle is related to monitoring and assessment requirements. Land managers are to evaluate the degree to which goals & objectives are achieved, deviations in management, unexpected effects, and social and environmental effects[20]. Also, research and data collection are to be completed and used for growth and yield modeling, regeneration planning and evaluation, cost and productivity reviews, and monitoring the composition and observed changes in flora and fauna[21]. The standard also includes requirements to inventory growth, mortality, stocking, regeneration, non-timber forest products, water resources, soils, and pests - as well as composition and structure[22].

Principle 8 (Monitoring and Assessment) includes Indicator 8.2.b.1, which states:

> "An inventory system is established and records are maintained for…stand-level and forest-level composition and structure (e.g., by use of tools, such as ecological classification system)…[22]"

Given the large number and wide range of monitoring and assessment requirements within Principle 8, a well-designed and consistently implemented ECS can provide a framework to efficiently and comprehensively address this principle.

There are additional aspects of the FSC Standard that link to the use of an ECS, as illustrated in the following examples taken from FSC Certification Reports[23].

County Land Departments

There are four county land departments in Minnesota that have FSC certificates for their forest management: Aitkin, Cass, Itasca, and Lake. The certification reports for all four of these organizations reference the development and use of an ECS as a tool for informing forest management planning and decision-making and evidence of compliance with the FSC standard.

---

[19] Indicators 6.1.a. and 6.1.b from the *Regional Forest Stewardship Standard for the Lake States-Central Hardwoods Region (USA) Version LS V3.0.*

[20] Indicator 8.1.b

[21] Criteria 8.2

[22] Indicator 8.2.b.1

[23] FSC Certification Report Public Summaries are available at the websites of the accredited auditors (e.g. Scientific Certification Systems, SmartWood, WoodMark). Some certificate holders also post the reports and other information at their own organizational websites.

Excerpts from the various reports:

> "…[the] Forest Ecological System classification based on vegetation and soils provides the framework for management planning and decisions.[24]"

> "…[the land manager] uses Natural Plant Community Classification and manages the forest for long-term ecological integrity and stability.[25]"

> "..[the auditor] found the [ECS] capable of facilitating management decisions… a useful and functional tool…appears to be providing a positive benefit to…managers.[26]"

> "…management goals are driven by the [range of natural variation] and the [ECS]…The land is broken down into biophysical regions and biophysical landscape ecological units for silvicultural prescriptions. The…landscape is broken into ecosystem classes for range of natural variation (RNV) landscape goals.[27]"

Minnesota DNR

The FSC assessment of the Minnesota DNR included similar comments about the connections between the FSC standard and the use of an ECS:

> "…ecological classification system/native plant community (ECS/NPC) is beginning to play a role in determining specific tree species and cover types that are an ecological match for the site, landform, and moisture regime.[28]"

The FSC assessment also included requirements for the Minnesota DNR to further their use of their ECS:

> "…complete and implement…ECS/NPC for the Eastern Broadleaf Forest, and Silvicultural Guidelines to use with ECS/NPC within 2- years of award of certification."

> "Complete a programmatic assessment of the effectiveness of current training programs/protocols at providing the necessary skills to implement…ECS- and related silvicultural guidelines…"

[24] http://www.rainforest-alliance.org/forestry/documents/aitkin_county.pdf
[25] http://www.rainforest-alliance.org/forestry/documents/casscounty.pdf
[26] http://www.rainforest-alliance.org/forestry/documents/itasca.pdf
[27] http://www.rainforest-alliance.org/forestry/documents/lakecountyfmpubsum05.pdf
[28] http://www.scscertified.com/forestry/forest_certclients.html

Gaps & Trade-offs in Various Approaches

As illustrated by these examples, a wide variety of approaches have been taken to the development and application of ecological classification systems. The common theme is that each system intends to use ecological characteristics to identify ecological potentials and inform management decisions. Also, there is a clear link between ECS and forest certification standards.

The use of ECS is a response from the land management community to the need to improve its understanding of ecosystems and the complexity of natural systems. Instead of basing management decisions on cover types or other single attributes, land managers are using ECS to understand how a variety of conditions are interacting and the site potential that results. As with any classification system, there is always the hazard that it will be applied in a cookbook fashion with all or most sites that fit a certain classification being automatically given the same management treatment. There is also the risk that field interpretations will inappropriately simplify the classification procedure and inappropriately use an approach of individual 'indicator species'. Clearly, these are hazards that land managers and ECS training efforts need to guard against.

Although an ECS can be a very powerful tool for gaining an understanding of an ecosystem, the classification always needs to be confirmed and reconfirmed with site evaluations and current understandings. Special circumstances also need to be taken into consideration.

One of the leading benefits of an ECS is that it provides a framework for discussing management alternatives. Once the ECS classification for a site is determined, there are usually some management options that will be largely eliminated and others that will rise to the top for consideration. So long as there is agreement on the ECS classification that has been made for the site, there should also be a corresponding level of agreement on available options. With this foundation, the discussion and debate can occur within a defined range of possibilities.

The use of an ECS doesn't mean there won't be disagreements about management decisions, but use of this tool does create opportunities for land managers and stakeholders to share a common language and start with a shared understanding of what the management alternatives are for a given forest. This benefit of an ECS is recognized within the forest certification programs and within the FSC standard in particular.

An ECS also creates valuable research, data collection and learning opportunities. If the entire land management community, including researchers, public and private land owners and managers, land trusts, conservation organizations, and others use complementary classification systems, then results of management techniques, silvicultural practices, and even insect and disease control strategies can be more effectively compared and translated across shared ecosystem classifications.

The Bottom Line

The use of ecological classification systems represents both a natural evolution in the practice of forestry and a valuable expansion of considerations in forest management decision-making. These systems also lend themselves well to addressing a variety of expectations and requirements in forest certification standards. In short, a well-developed and consistently applied ecological classification system can improve forest management, enhance decision making, engage stakeholders, and help maintain compliance with certification standards.

Resources

Cleland, D.T.; Avers, P.E.; McNab, W.H.; Jensen, M.E.; Bailey, R.G., King, T.; Russell, W.E. 1997. National Hierarchical Framework of Ecological Units. Published in, Boyce, M. S.; Haney, A., ed. 1997. Ecosystem Management Applications for Sustainable Forest and Wildlife Resources. Yale University Press, New Haven, CT. pp. 181-200. (http://files.dnr.state.mn.us/natural_resources/ecs/nhfeu.pdf)

Field Guide to the Native Plant Communities of Minnesota: The Prairie Parkland and Tallgrass Aspen Parklands Provinces. by Minnesota DNR Ecological Land Classification Program, Minnesota County Biological Survey and Natural Heritage and Nongame Research Program, 2006.

Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province. by Minnesota DNR Ecological Land Classification Program, Minnesota County Biological Survey and Natural Heritage and Nongame Research Program, 2005.

Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province. by Minnesota DNR Ecological Land Classification Program, Minnesota County Biological Survey and Natural Heritage and Nongame Research Program, 2003.

Kotar, John, and Joseph A. Kovach, and Timothy L. Burger. 2002. *A Guide to Forest Communities and Habitat Types of Northern Wisconsin, second edition*. Available through the University of Wisconsin-Madison, Department of Forest Ecology and Management.

Kotar, John and Timothy L. Burger. 1996. *A Guide to Forest Communities and Habitat Types of Central and Southern Wisconsin.* Available through the University of Wisconsin-Madison, Department of Forest Ecology and Management.

This report was prepared by

DOVETAIL PARTNERS, INC.

Dovetail Partners is a 501(c)(3) nonprofit corporation that collaborates to develop unique concepts, systems, programs, and models to foster sustainable forestry and catalyze responsible trade and consumption.

FOR MORE INFORMATION OR TO REQUEST ADDITIONAL COPIES OF THIS REPORT, CONTACT US AT:

INFO@DOVETAILINC.ORG

WWW.DOVETAILINC.ORG

612-333-0430

This Dovetail Report is made possible through the generous support of the Blandin Foundation and its Vital Forests/Vital Communities Initiative. For more information, visit http://www.blandinfoundation.org/.

BLANDIN FOUNDATION™

Additional support comes from the Surdna Foundation and individual donors.

DOVETAIL PARTNERS, INC.
528 Hennepin Ave, Suite 202
Minneapolis, MN 55403
Phone: 612-333-0430
Fax: 612-339-0432
www.dovetailinc.org